

**SAVVAS**

# Experience Chemistry

**ESSENTIAL  
KIT**

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**FLINN  
SCIENTIFIC**

EXCLUSIVE PARTNERSHIP

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# MODEL ELECTRON CONFIGURATION

## Materials Included in Kit *(for 10 groups of students)*

- BBs, box of 1500
- Envelope containing:
  - Seating chart, 1
  - Concert floor plan, 1
- Forceps, plastic, package of 10
- Magnetic tape, rolls, 10
- Weighing dishes, medium, package of 10
- Weighing dishes, small, package of 10

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*The kit includes materials to conduct one of the leveled inquiry labs. The following lists convey which materials (per group) are needed for each.*

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### Short Inquiry

### Guided Inquiry

- 
- Seating chart
  - Concert floor Plan
  - Worksheet

- 
- Seating chart
  - Concert floor Plan
  - Worksheet

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### Open Inquiry

### Advanced Inquiry

- 
- Seating chart
  - Concert floor Plan
  - Worksheet

- 
- BBs, 100
  - Forceps, plastic
  - Weighing dish, small
  - Magnetic strip, 20 cm
-

# EVALUATE ATOMIC STRUCTURE WITH FLAME TESTS PERFORMANCE ASSESSMENT

## **Materials Included in Kit** (for 10 groups of students)

- Calcium chloride,  $\text{CaCl}_2 \cdot 2\text{H}_2\text{O}$ , 50 g
- Potassium chloride,  $\text{KCl}$ , 50 g
- Sodium chloride,  $\text{NaCl}$ , 50 g
- Strontium chloride,  $\text{SrCl}_2 \cdot 6\text{H}_2\text{O}$ , 50 g
- Avery labels, sheet of 80
- Bingo chips, red, blue, yellow, and green, 120 each
- Construction paper, white, 15 sheets
- Energy level labels
- Filter paper, package of 60
- Glue stick
- Wooden splints, package of 100

# DEVELOP A PERIODIC TABLE

## Materials Included in Kit *(for 10 groups of students)*

- Plastic farm animals, 144
- Element card set, blue, 4
- Element card set, yellow, 3
- Element card set, green, 3

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*The materials included in this kit are all reusable. The following lists convey which materials (per group) are needed for each inquiry lab.*

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### Short Inquiry

- Plastic farm animals, 15

### Guided Inquiry

- Plastic farm animals, 15
- Deck of element cards

### Open Inquiry

- Plastic farm animals, 15
- Deck of element cards

### Advanced Inquiry

- Plastic farm animals, 15
- Deck of element cards

# CHARACTERISTICS OF IONIC BONDS

## Materials Included in Kit (for 10 groups of students)

- Calcium carbonate,  $\text{CaCO}_3$ , 25 g
- Dextrose,  $\text{C}_6\text{H}_{12}\text{O}_6$ , 20 g
- Dodecyl alcohol,  $\text{C}_{12}\text{H}_{26}\text{O}$ , 20 g
- Iron(III) oxide,  $\text{Fe}_2\text{O}_3$ , 30 g
- Potassium chloride,  $\text{KCl}$ , 25 g
- Salicylic acid,  $\text{C}_7\text{H}_6\text{O}_3$ , 20 g
- Sodium chloride,  $\text{NaCl}$ , 25 g
- Sucrose,  $\text{C}_{12}\text{H}_{22}\text{O}_{11}$ , 40 g
- Test tubes, glass, 45

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*The kit includes materials to conduct one of the leveled inquiry labs. The following lists convey which materials (per group) are needed for each.*

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### Short Inquiry

- Dextrose,  $\text{C}_6\text{H}_{12}\text{O}_6$ , 2 g
- Potassium chloride,  $\text{KCl}$ , 2 g
- Sodium chloride,  $\text{NaCl}$ , 2 g
- Sucrose,  $\text{C}_{12}\text{H}_{22}\text{O}_{11}$ , 2 g
- Test tubes, glass, 4

### Guided Inquiry

- Calcium carbonate,  $\text{CaCO}_3$ , 2 g
- Dextrose,  $\text{C}_6\text{H}_{12}\text{O}_6$ , 2 g
- Dodecyl alcohol,  $\text{C}_{12}\text{H}_{26}\text{O}$ , 2 g
- Iron(III) oxide,  $\text{Fe}_2\text{O}_3$ , 2 g
- Potassium chloride,  $\text{KCl}$ , 2 g
- Salicylic acid,  $\text{C}_7\text{H}_6\text{O}_3$ , 2 g
- Sodium chloride,  $\text{NaCl}$ , 2 g
- Sucrose,  $\text{C}_{12}\text{H}_{22}\text{O}_{11}$ , 2 g
- Test tubes, glass, 4

### Open Inquiry

- Dextrose,  $\text{C}_6\text{H}_{12}\text{O}_6$ , 2 g
- Potassium chloride,  $\text{KCl}$ , 2 g
- Sodium chloride,  $\text{NaCl}$ , 2 g
- Sucrose,  $\text{C}_{12}\text{H}_{22}\text{O}_{11}$ , 2 g
- Test tubes, glass, 4

### Advanced Inquiry

- Dextrose,  $\text{C}_6\text{H}_{12}\text{O}_6$ , 2 g
- Potassium chloride,  $\text{KCl}$ , 2 g
- Sodium chloride,  $\text{NaCl}$ , 2 g
- Sucrose,  $\text{C}_{12}\text{H}_{22}\text{O}_{11}$ , 2 g
- Test tubes, glass, 4

# INVESTIGATE COVALENT BONDS

## Materials Included in Kit (for 10 groups of students)

- Calcium carbonate,  $\text{CaCO}_3$ , 25 g
- Dextrose,  $\text{C}_6\text{H}_{12}\text{O}_6$ , 20 g
- Dodecyl alcohol,  $\text{C}_{12}\text{H}_{26}\text{O}$ , 20 g
- Iron(III) oxide,  $\text{Fe}_2\text{O}_3$ , 30 g
- Potassium chloride,  $\text{KCl}$ , 25 g
- Salicylic acid,  $\text{C}_7\text{H}_6\text{O}_3$ , 20 g
- Sodium chloride,  $\text{NaCl}$ , 25 g
- Sucrose,  $\text{C}_{12}\text{H}_{22}\text{O}_{11}$ , 40 g
- Test tube, glass, 45

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*The kit includes materials to conduct one of the leveled inquiry labs. The following lists convey which materials (per group) are needed for each.*

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### Short Inquiry

- Dextrose,  $\text{C}_6\text{H}_{12}\text{O}_6$ , 2 g
- Potassium chloride,  $\text{KCl}$ , 2 g
- Sodium chloride,  $\text{NaCl}$ , 2 g
- Sucrose,  $\text{C}_{12}\text{H}_{22}\text{O}_{11}$ , 2 g
- Test tube, glass, 4

### Guided Inquiry

- Calcium carbonate,  $\text{CaCO}_3$ , 2 g
- Dextrose,  $\text{C}_6\text{H}_{12}\text{O}_6$ , 2 g
- Dodecyl alcohol,  $\text{C}_{12}\text{H}_{26}\text{O}$ , 2 g
- Iron(III) oxide,  $\text{Fe}_2\text{O}_3$ , 2 g
- Potassium chloride,  $\text{KCl}$ , 2 g
- Salicylic acid,  $\text{C}_7\text{H}_6\text{O}_3$ , 2 g
- Sodium chloride,  $\text{NaCl}$ , 2 g
- Sucrose,  $\text{C}_{12}\text{H}_{22}\text{O}_{11}$ , 2 g
- Test tube, glass, 4

### Open Inquiry

- Dextrose,  $\text{C}_6\text{H}_{12}\text{O}_6$ , 2 g
- Potassium chloride,  $\text{KCl}$ , 2 g
- Sodium chloride,  $\text{NaCl}$ , 2 g
- Sucrose,  $\text{C}_{12}\text{H}_{22}\text{O}_{11}$ , 2 g
- Test tube, glass, 4

### Advanced Inquiry

- Dextrose,  $\text{C}_6\text{H}_{12}\text{O}_6$ , 2 g
- Potassium chloride,  $\text{KCl}$ , 2 g
- Sodium chloride,  $\text{NaCl}$ , 2 g
- Sucrose,  $\text{C}_{12}\text{H}_{22}\text{O}_{11}$ , 2 g
- Test tube, glass

# CHEMICAL NAMES AND FORMULAS

## Materials Included in Kit (for 10 groups of students)

- Copper(II) chloride solution, 0.1 M,  $\text{CuCl}_2$ , 500 mL
- Iron(III) nitrate solution, 0.1 M,  $\text{Fe}(\text{NO}_3)_3 \cdot 9\text{H}_2\text{O}$ , 500 mL
- Sodium hydroxide solution, 0.1 M,  $\text{NaOH}$ , 500 mL
- Sodium phosphate solution, 0.1 M,  $\text{Na}_3\text{PO}_4 \cdot 12\text{H}_2\text{O}$ , 500 mL
- Ion formula charts, 15
- Models of anions sheets, 15
- Models of cations sheets, 15
- Pipets, Beral-type, thin-stem, 60
- Test tubes, 10 × 75 mm, 100
- Wood splints, package of 100

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*The kit includes materials to conduct one of the leveled inquiry labs. The following lists convey which materials (per group) are needed for each.*

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### Short Inquiry

- Ion formula chart
- Models of anions sheet
- Models of cations sheet
- Student handout

### Guided Inquiry

- Ion formula chart
- Models of anions sheet
- Models of cations sheet
- Student handout

### Open Inquiry

- Copper(II) chloride solution, 0.1 M,  $\text{CuCl}_2$ , 25 mL
- Iron(III) nitrate solution, 0.1 M,  $\text{Fe}(\text{NO}_3)_3 \cdot 9\text{H}_2\text{O}$ , 25 mL
- Sodium hydroxide solution, 0.1 M,  $\text{NaOH}$ , 25 mL
- Sodium phosphate solution, 0.1 M,  $\text{Na}_3\text{PO}_4 \cdot 12\text{H}_2\text{O}$ , 25 mL
- Ion formula chart
- Models of anions sheet
- Models of cations sheet
- Pipets, Beral-type, thin-stem, 4
- Test tubes, 10 × 75 mm, 8
- Wood splints, 8

### Advanced Inquiry

- Iron(III) nitrate solution, 0.1 M,  $\text{Fe}(\text{NO}_3)_3 \cdot 9\text{H}_2\text{O}$ , 25 mL
- Sodium hydroxide solution, 0.1 M,  $\text{NaOH}$ , 25 mL
- Ion Formula Chart
- Models of Anions
- Models of Cations
- Pipets, Beral-type, thin-stem, 2
- Test tubes, 10 × 75 mm, 4
- Wood splints, 4



# MEASURE THE ENERGY OF A PHASE CHANGE

## Materials Included in Kit (for 10 groups of students)

- Cetyl alcohol,  $C_{16}H_{33}OH$ , 30 g
- Ethanol,  $C_2H_5OH$ , 120 mL
- Lauric acid,  $C_{11}H_{23}CO_2H$ , 30 g
- Stearic acid,  $C_{17}H_{35}CO_2H$ , 30 g
- Polystyrene foam cups, package of 30
- Rubber bands, orthodontic, package of 100
- Test tube, 20 mm x 150 mm, 10
- Weighing dishes, 10

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*The kit includes materials to conduct one of the leveled inquiry labs. The following lists convey which materials (per group) are needed for each.*

---

### Short Inquiry

- Ethanol,  $C_2H_5OH$ , 10 mL
- Rubber band, 3

### Open Inquiry

- Organic solid
  - Cetyl alcohol,  $C_{16}H_{33}OH$ , 6 g
  - Lauric acid,  $C_{11}H_{23}CO_2H$ , 6 g
  - Stearic acid,  $C_{17}H_{35}CO_2H$ , 6 g
- Polystyrene foam cups, 2
- Test tube, 20 mm x 150 mm
- Weighing dish

### Guided Inquiry

- Organic solid
  - Cetyl alcohol,  $C_{16}H_{33}OH$ , 6 g
  - Lauric acid,  $C_{11}H_{23}CO_2H$ , 6 g
  - Stearic acid,  $C_{17}H_{35}CO_2H$ , 6 g
- Polystyrene foam cups, 2
- Test tube, 20 mm x 150 mm
- Weighing dish

### Advanced Inquiry

- Organic solid
  - Cetyl alcohol,  $C_{16}H_{33}OH$ , 6 g
  - Lauric acid,  $C_{11}H_{23}CO_2H$ , 6 g
  - Stearic acid,  $C_{17}H_{35}CO_2H$ , 6 g
- Polystyrene foam cups, 2
- Test tube, 20 mm x 150 mm
- Weighing dish

# MELT IONIC AND MOLECULAR COMPOUNDS

## Materials Included in Kit *(for 10 groups of students)*

- Acetic acid, glacial,  $C_2H_3O_2H$ , 70 mL
- Ammonium acetate,  $NH_4C_2H_3O_2$ , 100 g
- Sodium acetate, anhydrous,  $NaC_2H_3O_2$ , 60 g
- Sodium chloride,  $NaCl$ , 100 g
- Weighing dishes, 30

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*The kit includes materials to conduct one of the leveled inquiry labs. The following lists convey which materials (per group) are needed for each.*

---

### Short Inquiry

- Acetic acid, glacial,  $C_2H_3O_2H$ , 5 mL
- Ammonium acetate,  $NH_4C_2H_3O_2$ , 5 g

### Guided Inquiry

- Acetic acid, glacial,  $C_2H_3O_2H$ , 5 mL
- Ammonium acetate,  $NH_4C_2H_3O_2$ , 5 g
- Sodium acetate, anhydrous,  $NaC_2H_3O_2$ , 5 g
- Sodium chloride,  $NaCl$ , 5 g
- Weighing dish, 3

### Open Inquiry

- Acetic acid, glacial,  $C_2H_3O_2H$ , 5 mL
- Ammonium acetate,  $NH_4C_2H_3O_2$ , 5 g
- Sodium acetate, anhydrous,  $NaC_2H_3O_2$ , 5 g
- Sodium chloride,  $NaCl$ , 5 g
- Weighing dish, 3

### Advanced Inquiry

- Acetic acid, glacial,  $C_2H_3O_2H$ , 5 mL
- Ammonium acetate,  $NH_4C_2H_3O_2$ , 5 g
- Sodium acetate, anhydrous,  $NaC_2H_3O_2$ , 5 g
- Sodium chloride,  $NaCl$ , 5 g
- Weighing dish, 3

# AQUEOUS SOLUTIONS

## Materials Included in Kit *(for 10 groups of students)*

- Copper(II) sulfate,  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ , 300 g
  - Dextrose (glucose), anhydrous,  $\text{C}_6\text{H}_{12}\text{O}_6$ , 300 g
  - Weighing dishes, package of 10
- 

*The kit includes materials to conduct one of the leveled inquiry labs. The following lists convey which materials (per group) are needed for each.*

---

### Short Inquiry

- Copper(II) sulfate,  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ , 25 g
- Weighing dish

### Guided Inquiry

- Copper(II) sulfate, 25 g
- Glucose,  $\text{C}_6\text{H}_{12}\text{O}_6$ , 25 g
- Weighing dish

### Open Inquiry

- Copper(II) sulfate,  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ , 25 g
- Glucose,  $\text{C}_6\text{H}_{12}\text{O}_6$ , 25 g
- Weighing dish

### Advanced Inquiry

- Copper(II) sulfate, 25 g
- Glucose,  $\text{C}_6\text{H}_{12}\text{O}_6$ , 25 g
- Weighing dish

# DESCRIBE SMALL-SCALE MATTER USING THE MOLE

## Materials Included in Kit *(for 10 groups of students)*

- Aluminum foil, roll
  - Navy beans, dry, 2 lbs
  - Rice, dry, 2 lbs
- 

*The materials included in this kit are all reusable. The following lists convey which materials (per group) are needed for each.*

---

### Short Inquiry

- Aluminum foil
- Rice

### Guided Inquiry

- Aluminum foil
- Navy beans
- Rice

### Open Inquiry

- Aluminum foil
- Navy beans
- Rice

### Advanced Inquiry

- Aluminum foil
- Navy beans
- Rice

# MOLE RATIOS

## Materials Included in Kit *(for 10 groups of students)*

- Acetone,  $\text{CH}_3\text{COCH}_3$ , 250 mL
- Copper wire, Cu, 457 cm
- Nitric acid,  $\text{HNO}_3$ , 3 M, 10 mL
- Silver nitrate,  $\text{AgNO}_3$ , 25 g
- Wooden splints, package of 30

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*The kit includes materials to conduct one of the leveled inquiry labs. The following lists convey which materials (per group) are needed for each.*

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### Short Inquiry

- Acetone,  $\text{CH}_3\text{COCH}_3$ , 125-mL (shared )
- Copper wire, Cu, 25 cm
- Nitric acid,  $\text{HNO}_3$ , 3 M, 3 drops
- Silver nitrate,  $\text{AgNO}_3$ , 1.5 g
- Wooden splint

### Guided Inquiry

- Acetone,  $\text{CH}_3\text{COCH}_3$ , 125-mL (shared)
- Copper wire, Cu, 25 cm
- Nitric acid,  $\text{HNO}_3$ , 3 M, 3 drops
- Silver nitrate,  $\text{AgNO}_3$ , 1.5 g
- Wooden splint

### Open Inquiry

- Acetone,  $\text{CH}_3\text{COCH}_3$ , 125-mL (shared)
- Copper wire, Cu, 25 cm
- Nitric acid,  $\text{HNO}_3$ , 3 M, 3 drops
- Silver nitrate,  $\text{AgNO}_3$ , 1.5 g
- Wooden splint

### Advanced Inquiry

- Acetone,  $\text{CH}_3\text{COCH}_3$ , 125-mL (shared)
- Copper wire, Cu, 25 cm
- Nitric acid,  $\text{HNO}_3$ , 3 M, 3 drops
- Silver nitrate,  $\text{AgNO}_3$ , 1.5 g
- Wooden splint

# DETERMINE AN EMPIRICAL FORMULA

## Materials Included in Kit *(for 10 groups of students)*

- Barium chloride dihydrate,  $\text{BaCl}_2 \cdot 2\text{H}_2\text{O}$ , 75 g
- Labels, 20
- Vials with snap-on caps, 10

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*The kit includes materials to conduct one of the leveled inquiry labs. The following lists convey which materials (per group) are needed for each.*

---

### Short Inquiry

- Unknown Binary Compound in labeled vial, 3-4 g

### Guided Inquiry

- Unknown Binary Compound in labeled vial, 3-4 g

### Open Inquiry

- Unknown Binary Compound in labeled vial, 3-4 g

### Advanced Inquiry

- Unknown Binary Compound in labeled vial, 3-4 g

# EVALUATE CHEMICAL REACTIONS

## Materials Included in Kit *(for 10 groups of students)*

- Aluminum foil, roll
- Calcium carbonate, 25 g
- Copper(II) chloride solution,  $\text{CuCl}_2$ , 0.05 M, 1 L
- Copper(II) chloride solution,  $\text{CuCl}_2$ , 1.0 M, 1 L
- Hydrochloric acid, 2 M, 500 mL
- Magnesium carbonate,  $\text{MgCO}_3$ , 100 g
- Sodium phosphate solution,  $\text{Na}_3\text{PO}_4$ , 0.05 M, 1 L
- Balloons, 12 in., 40
- Bingo chips, blue, package of 120, 2
- Bingo chips, green, package of 250
- Bingo chips, red, package of 250
- Bingo chips, yellow, package of 250

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*The kit includes materials to conduct one of the leveled inquiry labs. The following lists convey which materials (per group) are needed for each.*

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### Short Inquiry

- Bingo chips

### Guided Inquiry

- Bingo chips
- Aluminum foil, small piece
- Copper(II) chloride solution,  $\text{CuCl}_2$ , 0.05 M, 50 mL
- Copper(II) chloride solution,  $\text{CuCl}_2$ , 1.0 M, 50 mL
- Sodium phosphate solution,  $\text{Na}_3\text{PO}_4$ , 0.05 M, 50 mL

### Open Inquiry

- Bingo chips
- Aluminum foil, small piece
- Copper(II) chloride solution,  $\text{CuCl}_2$ , 0.05 M, 50 mL
- Copper(II) chloride solution,  $\text{CuCl}_2$ , 1.0 M, 50 mL
- Sodium phosphate solution,  $\text{Na}_3\text{PO}_4$ , 0.05 M, 50 mL

### Advanced Inquiry

- Calcium carbonate, 0.5 g
- Hydrochloric acid, 10 mL
- Magnesium carbonate, 0.5 g
- Balloons, 12 in., 2

# TYPES OF CHEMICAL REACTIONS

## Materials Included in Kit (for 10 groups of students)

- Aluminum foil, 30.5 x 30.5 cm sheet
- Calcium chloride solution, 0.5 M,  $\text{CaCl}_2$ , 60 mL
- Calcium turnings, Ca, 5 g
- Copper(II) chloride solution,  $\text{CuCl}_2$ , 0.05 M, 500 mL
- Copper(II) chloride solution,  $\text{CuCl}_2$ , 1.0 M, 500 mL
- Copper wire, Cu, 1.8 m
- Ethyl alcohol, 95%, 50 mL
- Magnesium metal ribbon, Mg, 91.5 cm
- Silver nitrate solution, 0.5 M, 100 mL
- Sodium bicarbonate,  $\text{NaHCO}_3$ , 20
- Sodium carbonate solution, 0.5 M, 60 mL
- Sodium metal, 2 g
- Sodium phosphate solution,  $\text{Na}_3\text{PO}_4$ , 0.05 M, 500 mL
- Sodium sulfate solution,  $\text{Na}_2\text{SO}_4$ , 0.5 M, 500 mL
- Alligator clips, 10
- Cobalt chloride test papers and instruction card
- Pencil leads, tube of 12
- Petri dishes, disposable, 20
- Pipets, Beral-type, 40
- Test tubes, borosilicate glass, 13 mm x 100 mm, 45
- Wooden splints, package of 100

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*The kit includes materials to conduct one of the leveled inquiry labs. The following lists convey which materials (per group) are needed for each.*

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### Short Inquiry

- Calcium chloride solution, 0.5 M, 3 mL
- Copper wire, 10 cm
- Magnesium metal ribbon, 2.5 cm
- Silver nitrate solution, 0.5 M, 5 mL
- Sodium bicarbonate, 1 g
- Sodium carbonate solution, 0.5 M, 3 mL
- Cobalt chloride test paper
- Pipets, Beral-type, 3
- Test tubes, borosilicate glass, 13 mm x 100 mm, 3
- Wooden splint

### Guided Inquiry

- Aluminum foil, 2.5 cm piece
- Calcium chloride solution, 0.5 M, 3 mL
- Copper(II) chloride solution, 0.05 M, 40 mL
- Copper(II) chloride solution, 1.0 M, 40 mL
- Copper wire, 4 in.
- Magnesium metal ribbon, 1 in.
- Silver nitrate solution, 0.5 M, 5 mL
- Sodium bicarbonate, 1 g
- Sodium carbonate solution, 0.5 M, 3 mL
- Sodium phosphate solution, 0.05 M, 40 mL
- Sodium sulfate solution, 0.5 M, 40 mL
- Battery clip with alligator ends
- Petri dish, disposable
- Pipet, 10
- Test tubes, 5



# TYPES OF CHEMICAL REACTIONS – continued

## Open Inquiry

- Calcium chloride solution, 0.5 M, 3 mL
- Copper wire, 10 cm
- Magnesium metal ribbon, 2.5 cm
- Silver nitrate solution, 0.5 M, 5 mL
- Sodium bicarbonate, 1 g
- Sodium carbonate solution, 0.5 M, 3 mL
- Cobalt chloride test paper
- Pipets, Beral-type, 3
- Test tubes, borosilicate glass, 13 mm × 100 mm, 3
- Wooden splint

## Advanced Inquiry

- Calcium turnings, 0.3 g
- Magnesium ribbon, 25 mm
- Pipets, Beral-type, 2

# DETERMINATION OF REACTION OUTPUT

## Materials Included in Kit (for 10 groups of students)

- Calcium acetate,  $\text{Ca}(\text{C}_2\text{H}_3\text{O}_2)_2 \cdot \text{H}_2\text{O}$ , 25 g
- Calcium chloride,  $\text{CaCl}_2 \cdot 2\text{H}_2\text{O}$ , 300 g
- Magnesium sulfate,  $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$ , 50 g
- Potassium carbonate,  $\text{K}_2\text{CO}_3$ , 100 g
- Sodium bicarbonate,  $\text{NaHCO}_3$ , 100 g
- Sodium carbonate,  $\text{Na}_2\text{CO}_3$ , 100 g
- Universal indicator solution, 20 mL
- Zinc sulfate,  $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$ , 25 g
- Glass wool, 3 g
- Universal indicator charts, 10

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*The kit includes materials to conduct one of the leveled inquiry labs. The following lists convey which materials (per group) are needed for each.*

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### Short Inquiry

- Sodium bicarbonate,  $\text{NaHCO}_3$ , 4–5 g
- Universal indicator solution, 1–2 drops
- Universal indicator chart
- Glass wool “paintbrush”

### Guided Inquiry

- Assigned reaction mixture, see *Teaching Tips*

### Open Inquiry

- Assigned reaction mixture, see *Teaching Tips*

### Advanced Inquiry

- Assigned reaction mixture, see *Teaching Tips*

# THE THERMODYNAMICS OF HAND WARMERS

## Materials Included in Kit *(for 10 groups of students)*

- Ammonium chloride,  $\text{NH}_4\text{Cl}$ , 350 g
- Calcium chloride,  $\text{CaCl}_2$ , 300 g
- Sodium chloride,  $\text{NaCl}$ , 300 g
- Sodium hydroxide,  $\text{NaOH}$ , 500 g
- Polystyrene cups, 20
- Weighing dishes, 50

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*The kit includes materials to conduct one of the leveled inquiry labs. The following lists convey which materials (per group) are needed for each.*

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### Short Inquiry

- Ammonium chloride,  $\text{NH}_4\text{Cl}$ , 15 g
- Calcium chloride,  $\text{CaCl}_2$ , 15 g
- Solution vessel (two nested polystyrene cups)
- Weighing dishes

### Guided Inquiry

- Ammonium chloride,  $\text{NH}_4\text{Cl}$ , 15 g
- Calcium chloride,  $\text{CaCl}_2$ , 15 g
- Sodium chloride,  $\text{NaCl}$ , 15 g
- Sodium hydroxide,  $\text{NaOH}$ , 15 g
- Solution vessel (two nested polystyrene cups)
- Weighing dishes

### Open Inquiry

- Ammonium chloride,  $\text{NH}_4\text{Cl}$ , 15 g
- Calcium chloride,  $\text{CaCl}_2$ , 15 g
- Sodium chloride,  $\text{NaCl}$ , 15 g
- Sodium hydroxide,  $\text{NaOH}$ , 15 g
- Solution vessel (two nested polystyrene cups)
- Weighing dishes

### Advanced Inquiry

- Ammonium chloride,  $\text{NH}_4\text{Cl}$ , 15 g
- Calcium chloride,  $\text{CaCl}_2$ , 15 g
- Sodium chloride,  $\text{NaCl}$ , 15 g
- Sodium hydroxide,  $\text{NaOH}$ , 15 g
- Solution vessel (two nested polystyrene cups)
- Weighing dishes

# HESS'S LAW AND THE COMBUSTION OF A METAL

## Materials Included in Kit *(for 10 groups of students)*

- Hydrochloric acid, HCl, 1 M, 800 mL
- Magnesium ribbon, Mg, 3 feet
- Magnesium oxide, MgO, 10 g
- Calorimeters, small scale, 10
- Weighing dishes, 20

---

*The kit includes materials to conduct one of the leveled inquiry labs. The following lists convey which materials (per group) are needed for each.*

---

### Short Inquiry

- Hydrochloric acid, HCl, 1 M, 60 mL
- Magnesium ribbon, Mg, 7 cm strip
- Calorimeter, small scale
- Weighing dish

### Guided Inquiry

- Hydrochloric acid, HCl, 1 M, 60 mL
- Magnesium ribbon, Mg, 7 cm strip
- Magnesium oxide, MgO, 0.4 g
- Calorimeter, small scale
- Weighing dish

### Open Inquiry

- Hydrochloric acid, HCl, 1 M, 60 mL
- Magnesium ribbon, Mg, 7 cm strip
- Magnesium oxide, MgO, 0.4 g
- Calorimeter, small scale
- Weighing dish

### Advanced Inquiry

- Hydrochloric acid, HCl, 1 M, 60 mL
  - Magnesium ribbon, Mg, 7 cm strip
  - Magnesium oxide, MgO, 0.4 g
  - Calorimeter, small scale
  - Weighing dish
-

# RELATIONSHIPS BETWEEN GAS VARIABLES

## Materials Included in Kit (for 10 groups of students)

- Sodium chloride, NaCl, 120 g
- Petroleum jelly, foilpac, 5 g, pkg/10
- Syringe tip cap, 10
- Syringe, disposable, 35 mL, 10
- Wooden base with large (23-mm diameter) pre-drilled hole, 10
- Wood splint, pkg/100

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*The kit includes materials to conduct one of the leveled inquiry labs. The following lists convey which materials (per group) are needed for each. Both included and any additional materials that may be needed are presented.*

---

### Short Inquiry

#### Included in Kit:

- Sodium chloride, NaCl, 20 g
- Petroleum jelly, foilpac, 5 g
- Syringe tip cap, 1
- Syringe, disposable, 35 mL, 1
- Wooden base with large (23-mm diameter) pre-drilled hole
- Wood splint

#### Additional Materials Required:

- Ice cubes
- Water, tap or distilled
- Balance, 0.1 g precision
- Beakers, 600 mL, 4
- Beaker tongs, 1
- Beral-type pipet, 1
- Heat-resistant gloves
- Various masses, such as small books (4–7)
- Hot plate
- Stirring rod, glass, 1
- Spatula or scoop
- Thermometer or temperature sensor
- Weighing dish or paper, 1

### Guided Inquiry

#### Included in Kit:

- Sodium chloride, NaCl, 20 g
- Petroleum jelly, foilpac, 5 g
- Syringe tip cap, 1
- Syringe, disposable, 35 mL, 1
- Wooden base with large (23-mm diameter) pre-drilled hole
- Wood splint

#### Additional Materials Required:

- Ice cubes
- Water, tap or distilled
- Balance, 0.1 g precision
- Beakers, 600 mL, 4
- Beaker tongs, 1
- Beral-type pipet, 1
- Heat-resistant gloves
- Various masses, such as small books (4–7)
- Hot plate
- Stirring rod, glass, 1
- Spatula or scoop
- Thermometer or temperature sensor
- Weighing dish or paper, 1

# RELATIONSHIPS BETWEEN GAS VARIABLES – continued

## Open Inquiry

### Included in Kit:

- Sodium chloride, NaCl, 20 g
- Petroleum jelly, foilpac, 5 g
- Syringe tip cap, 1
- Syringe, disposable, 35 mL, 1
- Wooden base with large (23-mm diameter) pre-drilled hole
- Wood splint

### Additional Materials Required:

- Ice cubes
- Water, tap or distilled
- Balance, 0.1 g precision
- Beakers, 600 mL, 4
- Beaker tongs, 1
- Beral-type pipet, 1
- Heat-resistant gloves
- Various masses, such as small books (4–7)
- Hot plate
- Stirring rod, glass, 1
- Spatula or scoop
- Thermometer or temperature sensor
- Weighing dish or paper, 1

## Advanced Inquiry

### Included in Kit:

- Sodium chloride, NaCl, 20 g
- Petroleum jelly, foilpac, 5 g
- Syringe tip cap, 1
- Syringe, disposable, 35 mL, 1
- Wooden base with large (23-mm diameter) pre-drilled hole
- Wood splint

### Additional Materials Required:

- Ice cubes
- Water, tap or distilled
- Balance, 0.1 g precision
- Beakers, 600 mL, 4
- Beaker tongs, 1
- Beral-type pipet, 1
- Heat-resistant gloves
- Various masses, such as small books (4–7)
- Hot plate
- Stirring rod, glass, 1
- Spatula or scoop
- Thermometer or temperature sensor
- Weighing dish or paper, 1

# FEEDBACK AND CLIMATE CHANGE

## Materials Included in Kit *(for 10 groups of students)*

- Antacid effervescent tablets, 30
- Clay, ¼ lb stick, 2
- Plastic bottle, 1 L, 10

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*The kit includes materials to conduct one of the leveled inquiry labs. The following lists convey which materials (per group) are needed for each.*

---

### Short Inquiry

- Antacid effervescent tablets, 4
- Clear plastic bottles, 1 L, 2
- Chunk of modeling clay, 2

### Guided Inquiry

- Antacid effervescent tablets, 4
- Clear plastic bottles, 1 L, 2
- Chunk of modeling clay, 2

### Open Inquiry

- Antacid effervescent tablets, 4
- Clear plastic bottles, 1 L, 2
- Chunk of modeling clay, 2

### Advanced Inquiry

- Antacid effervescent tablets, 6
- Clear plastic bottles, 1 L, 2
- Chunk of modeling clay, 2

# HOW MELTING ICE AFFECTS SEA LEVELS

## Materials Included in Kit *(for 10 groups of students)*

- Clay, assorted colors, 20 sticks
- Plastic containers, 20

---

*The kit includes materials to conduct one of the leveled inquiry labs. The following lists convey which materials (per group) are needed for each.*

---

### Short Inquiry

- Plastic container

### Guided Inquiry

- Clay, 2 sticks
- Plastic containers, 2

### Open Inquiry

- Clay, 2 sticks
- Plastic containers, 2

### Advanced Inquiry

- Clay, 2 sticks
- Plastic containers, 2



# HUMAN ACTIVITY AND CARBON EMISSIONS

## Materials Included in Kit *(for 10 groups of students)*

- Bromthymol blue solution, 500 mL
- Copper(II) carbonate, 50 g
- Phenolphthalein indicator solution, 1%, 100 mL
- Sodium hydroxide solution, 0.1M, 150 mL
- Candles, 10
- Ointment-style glass jars with lids, 18
- Wine airlock, 6

---

*The kit includes materials to conduct one of the leveled inquiry labs. The following lists convey which materials (per group) are needed for each.*

---

## Short Inquiry

### Part A

- Phenolphthalein indicator solution, 1%, 2 drops
- Sodium hydroxide solution, 0.1M, 2 drops
- Candle
- Jar with lid, ointment-style

### Part B

- Bromothymol blue (BTB) indicator solution, 0.04% aqueous
- Sodium hydroxide solution, 0.1M, 2 drops
- Jars without lids, 2

### Part C

- Bromothymol blue (BTB) indicator solution, 0.04% aqueous
- Copper(II)carbonate,  $\text{Cu}_2\text{CO}_3(\text{OH})_2$ , 5 g
- Wine airlock

# HUMAN ACTIVITY AND CARBON EMISSIONS – continued

## Guided Inquiry

### Part A

- Phenolphthalein indicator solution, 1%, 2 drops
- Sodium hydroxide solution, 0.1M, 2 drops
- Candle
- Jar with lid, ointment-style

### Part B

- Bromothymol blue (BTB) indicator solution, 0.04% aqueous
- Sodium hydroxide solution, 0.1M, 2 drops
- Jars without lids, 2

### Part C

- Bromothymol blue (BTB) indicator solution, 0.04% aqueous
- Copper(II)carbonate,  $\text{Cu}_2\text{CO}_3(\text{OH})_2$ , 5 g
- Wine airlock

## Open Inquiry

### Part A

- Phenolphthalein indicator solution, 1%, 2 drops
- Sodium hydroxide solution, 0.1M, 2 drops
- Candle
- Jar with lid, ointment-style
- Wood splint

### Part B

- Bromothymol blue (BTB) indicator solution, 0.04% aqueous
- Sodium hydroxide solution, 0.1M, 2 drops
- Jars without lids, 2

### Part C

- Bromothymol blue (BTB) indicator solution, 0.04% aqueous
- Copper(II)carbonate,  $\text{Cu}_2\text{CO}_3(\text{OH})_2$ , 5 g
- Wine airlock

# HUMAN ACTIVITY AND CARBON EMISSIONS – continued

## Advanced Inquiry

### Part A

- Phenolphthalein indicator solution, 1%, 2 drops
- Sodium hydroxide solution, 0.1M, 2 drops
- Candle
- Jar with lid, ointment-style
- Wood splint

### Part B

- Bromothymol blue (BTB) indicator solution, 0.04% aqueous
- Sodium hydroxide solution, 0.1M, 2 drops
- Jars without lids, 2

### Part C

- Bromothymol blue (BTB) indicator solution, 0.04% aqueous
- Copper(II) carbonate,  $\text{Cu}_2\text{CO}_3(\text{OH})_2$ , 5 g

# SOLAR CELL TECHNOLOGY

## Materials Included in Kit *(for 7 groups of students)*

- Iodine/Potassium iodide electrolyte solution, 25 mL
- Nitric acid solution, 0.1 M, 50 mL
- Titanium oxide, TiO<sub>2</sub> nanocrystalline, 4 g
- Beral pipets, package of 20
- Binder clips, 14
- Bingo chips, package of 70
- Culture dishes, 20
- Microscope slides, plastic, 7
- Transparent indium tin oxide (ITO) coated glass slides, 14

---

*The kit includes materials to conduct one of the leveled inquiry labs. The following lists convey which materials (per group) are needed for each.*

---

### Short Inquiry

- Bingo chips, 5

### Guided Inquiry

- Iodine/Potassium iodide electrolyte solution, 2–3 drops
- TiO<sub>2</sub> nanocrystalline paste
- Beral pipet
- Binder clips, 2
- Culture (petri) dish, 1
- Microscope slide, plastic
- Transparent indium tin oxide (ITO) coated glass slide, 2

### Open Inquiry

- Iodine/Potassium iodide electrolyte solution, 2–3 drops
- TiO<sub>2</sub> nanocrystalline paste
- Beral pipet
- Binder clips, 2
- Culture (petri) dish, 1
- Microscope slide, plastic
- Transparent indium tin oxide (ITO) coated glass slide, 2

### Advanced Inquiry

- Iodine/potassium iodide electrolyte solution, 2–3 drops
- TiO<sub>2</sub> nanocrystalline paste
- Beral pipet
- Binder clips, 2
- Culture (petri) dish, 1
- Microscope slide, plastic
- Transparent indium tin oxide (ITO) coated glass slide, 2

# REACTION RATES: IODINE CLOCK

## Materials Included in Kit *(for 10 groups of students)*

- Potassium iodate solution, 0.2 M, 2.4 L
- Starch, soluble, potato, 52 g
- Sodium metabisulfite, 32 g
- Cups, clear plastic, 10 oz, package of 50

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*The kit includes materials to conduct one of the leveled inquiry labs. The following lists convey which materials (per group) are needed for each.*

---

### Short Inquiry

- Potassium iodate solution, 0.025 M, 200 mL
- Potassium iodate solution, 0.05 M, 200 mL
- Potassium iodate solution, 0.1 M, 200 mL
- Sodium metabisulfite/starch solution, 240 mL
- Plastic cups, small, 10 oz, 3

### Guided Inquiry

- Potassium iodate solution, 0.025 M, 200 mL
- Potassium iodate solution, 0.05 M, 200 mL
- Potassium iodate solution, 0.1 M, 200 mL
- Sodium metabisulfite/starch solution, 240 mL
- Plastic cups, small, 10 oz, 3

### Open Inquiry

- Potassium iodate solution, 0.2 M, 250 mL
- Sodium metabisulfite/starch solution, 320 mL
- Plastic cups, small, 10 oz, 4

### Advanced Inquiry

- Potassium iodate solution, 0.025 M, 200 mL
- Potassium iodate solution, 0.05 M, 600 mL
- Potassium iodate solution, 0.1 M, 200 mL
- Sodium metabisulfite/starch solution, 480 mL
- Plastic cups, small, 10 oz, 6

# TITRATIONS—THE STUDY OF ACID-BASE CHEMISTRY

## Materials Included in Kit *(for 10 groups of students)*

- Acetic Acid Solution Unknown A, 750 mL, 1.0 M
- Acetic Acid Solution Unknown B, 750 mL, 1.6 M
- Acetic Acid Solution Unknown C, 750 mL, 0.833 M
- Hydrochloric acid, HCl, 0.5 M, 60 mL
- Phenolphthalein indicator solution, 1.0%, 30 mL
- Potassium hydrogen phthalate,  $\text{KHC}_8\text{H}_4\text{O}_4$  or KHP, 25 g
- Sodium hydroxide, NaOH, 0.1 M, 1 L
- Sodium hydroxide solution, NaOH, 1.0 M, 800 mL
- Weighing dishes, 10

---

*The kit includes materials to conduct one of the leveled inquiry labs. The following lists convey which materials (per group) are needed for each.*

---

### Short Inquiry

- Hydrochloric acid of unknown concentration, 60 mL
- Phenolphthalein indicator solution, 1.0%, 1 mL
- Sodium hydroxide, 0.1 M, 50 mL

### Guided Inquiry

- Phenolphthalein indicator solution, 1.0%, 1 mL
- Potassium hydrogen phthalate,  $\text{KHC}_8\text{H}_4\text{O}_4$  or KHP, 1.0 g
- Sodium hydroxide solution, 1.0 M, 60 mL
- Vinegar sample of unknown concentration, 40 mL
- Weighing dish

### Open Inquiry

- Phenolphthalein indicator solution, 1.0%, 1 mL
- Sodium hydroxide solution, 0.1 M, 60 mL
- Sodium hydroxide solution, 1.0 M, 60 mL
- Vinegar sample of unknown concentration, 45 mL

### Advanced Inquiry

- Phenolphthalein indicator solution, 1.0%, 1 mL
- Potassium hydrogen phthalate, 1.0 g
- Sodium hydroxide solution, 1.0 M, 60 mL
- Unknown vinegar sample A, 20 mL
- Unknown vinegar sample B, 20 mL
- Unknown vinegar sample C, 20 mL
- Weighing dish

# THE pH OF SEAWATER

## Materials Included in Kit *(for 10 groups of students)*

- Acetic acid solution, CH<sub>3</sub>COOH, 2 M, 500 mL
- Sodium bicarbonate, NaHCO<sub>3</sub>, 50 g
- Sodium carbonate, Na<sub>2</sub>CO<sub>3</sub>, 10 g
- Sodium chloride, NaCl, 200 g
- Phenolphthalein indicator, 1 % solution, 30 mL
- Universal indicator solution, 30 mL
- Beral-type pipets, 40
- Universal indicator charts, 10
- Weighing dishes, 30

---

*The kit includes materials to conduct one of the leveled inquiry labs. The following lists convey which materials (per group) are needed for each.*

---

### Short Inquiry

- Acetic acid solution, 2 M, 30 mL
- Sodium bicarbonate, 3.5 g
- Sodium carbonate, 0.5 g
- Sodium chloride, 6 g
- Phenolphthalein indicator, 1 % solution, 0.5 mL
- Beral-type pipets
- Universal indicator chart
- Weighing dishes, 3

### Guided Inquiry

- Acetic acid solution, 2 M, 40 mL
- Sodium bicarbonate, 3.5 g
- Sodium carbonate, 0.5 g
- Sodium chloride, 15 g
- Phenolphthalein indicator, 1 % solution, 0.5 mL
- Universal indicator solution, 0.5 mL
- Beral-type pipets, 2
- Universal indicator chart
- Weighing dishes, 3

### Open Inquiry

- Acetic acid solution, 2 M, 40 mL
- Sodium bicarbonate, 3.5 g
- Sodium carbonate, 0.5 g
- Sodium chloride, 15 g
- Phenolphthalein indicator, 1 % solution, 0.5 mL
- Universal indicator solution, 0.5 mL
- Beral-type pipets, 2
- Universal indicator chart
- Weighing dishes, 3

### Advanced Inquiry

- Acetic acid solution, 2 M, 40 mL
- Sodium bicarbonate, 3.5 g
- Sodium carbonate, 0.5 g
- Sodium chloride, 15 g
- Phenolphthalein indicator, 1 % solution, 0.5 mL
- Universal indicator solution, 0.5 mL
- Beral-type pipets, 2
- Universal indicator chart
- Weighing dishes, 3

# THE FATE OF CARBONATE IN ACIDIFYING OCEANS

## Materials Included in Kit (for 10 groups of students)

- Calcium chloride,  $\text{CaCl}_2$ , 25 g
- Hydrochloric acid solution,  $\text{HCl}$ , 3.0 M, 50 mL
- Sodium bicarbonate,  $\text{NaHCO}_3$ , 20 g
- Sodium carbonate,  $\text{Na}_2\text{CO}_3$ , 20 g
- Sodium chloride,  $\text{NaCl}$ , 75 g
- Beral-type pipets, 100
- Weighing dishes, 20

---

*The kit includes materials to conduct one of the leveled inquiry labs. The following lists convey which materials (per group) are needed for each.*

---

### Short Inquiry

- Calcium chloride, 2 g
- Hydrochloric acid solution, 3.0 M, 3 mL
- Sodium bicarbonate, 1 g
- Sodium carbonate, 1 g
- Sodium chloride, 6 g
- Beral-type pipet, 7
- pH paper, 1.0–14.5
- Weighing dishes or paper

### Guided Inquiry

- Calcium chloride, 2 g
- Hydrochloric acid solution, 3.0 M, 3 mL
- Sodium bicarbonate, 1 g
- Sodium carbonate, 2 g
- Sodium chloride, 6 g
- Beral-type pipet, 9
- pH paper, 1.0–14.0
- Weighing dishes or paper

### Open Inquiry

- Calcium chloride, 2 g
- Hydrochloric acid solution, 3.0 M, 3 mL
- Sodium bicarbonate, 1 g
- Sodium carbonate, 2 g
- Sodium chloride, 6 g
- Beral-type pipet, 9
- pH paper, 1.0–14.0
- Weighing dishes or paper

### Advanced Inquiry

- Calcium chloride, 2 g
- Hydrochloric acid solution, 3.0 M, 3 mL
- Sodium bicarbonate, 1 g
- Sodium carbonate, 2 g
- Sodium chloride, 6 g
- Beral-type pipet, 9
- pH paper, 1.0–14.0
- Weighing dishes or paper



# METAL ACTIVITY

## Materials Included in Kit (for 10 groups of students)

- Copper strips, Cu, 1.2 × 15 cm, 5
- Copper(II) sulfate solution, CuSO<sub>4</sub>, 0.2 M, 100 mL
- Iron strips, Fe, 1.2 × 15 cm, 5
- Iron(II) sulfate heptahydrate, FeSO<sub>4</sub>·7H<sub>2</sub>O, 8 g\*
- Magnesium nitrate solution, Mg(NO<sub>3</sub>)<sub>2</sub>, 0.2 M, 100 mL
- Magnesium ribbon, Mg, 90 cm
- Silver nitrate solution, AgNO<sub>3</sub>, 0.2 M, 100 mL
- Zinc foil, Zn, 7 cm × 7 cm, 2 squares
- Zinc sulfate solution, ZnSO<sub>4</sub>, 0.2 M, 100 mL
- Cotton swabs, 75
- Pipets, Beral-type, 80

\* *Iron(II) sulfate solution, 0.2 M*: Dissolve 5.6 g of iron(II) sulfate heptahydrate in about 50 mL of distilled or deionized water. Stir to dissolve and dilute to 100 mL with water.

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*The kit includes materials to conduct one of the leveled inquiry labs. The following lists convey which materials (per group) are needed for each. Both included and any additional materials that may be needed are presented.*

---

### Short Inquiry

#### Included in Kit:

- Copper, Cu, 1-cm<sup>2</sup> strips, 2
- Copper(II) sulfate solution, CuSO<sub>4</sub>, 0.2M, 4 mL
- Iron, Fe, 1-cm<sup>2</sup> strips, 2
- Silver nitrate solution, AgNO<sub>3</sub>, 0.2M, 4 mL
- Zinc sulfate solution, ZnSO<sub>4</sub>, 0.2M, 4 mL
- Pipets, Beral-type, 3

#### Additional Materials Required:

- Forceps or tweezers
- Marking pen
- Paper towels
- Test tube, small, 4
- Ruler
- Sandpaper (optional)
- Distilled water and wash bottle
- Test tube rack

### Guided Inquiry

#### Included in Kit:

- Copper, Cu, 1 cm<sup>2</sup> strips, 5
- Copper(II) sulfate solution, CuSO<sub>4</sub>, 0.2M, 4 mL
- Iron, Fe, 1 cm<sup>2</sup> strips, 5
- Iron(II) sulfate solution, FeSO<sub>4</sub>, 0.2M, 4 mL
- Magnesium ribbon, Mg, 1 cm, 5
- Magnesium nitrate solution, Mg(NO<sub>3</sub>)<sub>2</sub>, 0.2M, 4 mL
- Silver nitrate solution, AgNO<sub>3</sub>, 0.2M, 4 mL
- Ruler
- Zinc foil, Zn, 1 cm<sup>2</sup> squares, 5
- Sandpaper (optional)
- Zinc sulfate solution, ZnSO<sub>4</sub>, 0.2M, 4 mL
- Pipets, Beral-type, 5

#### Additional Materials Required:

- Forceps or tweezers
- Marking pen
- Paper towels
- Reaction plate, 24-well
- Distilled water and wash bottle
- Toothpicks (optional)
- Cotton swabs

## METAL ACTIVITY – continued

### Open Inquiry

#### Included in Kit:

- Copper, Cu, 1 cm<sup>2</sup> strips, 5
- Copper(II) sulfate solution, CuSO<sub>4</sub>, 0.2M, 4 mL
- Iron, Fe, 1-cm<sup>2</sup> strips, 5
- Iron(II) sulfate solution, FeSO<sub>4</sub>, 0.2M, 4 mL
- Magnesium ribbon, Mg, 1 cm, 5
- Pipets, Beral-type, 5
- Magnesium nitrate solution, Mg(NO<sub>3</sub>)<sub>2</sub>, 0.2M, 4 mL
- Silver nitrate solution, AgNO<sub>3</sub>, 0.2M, 4 mL
- Zinc foil, Zn, 1 cm<sup>2</sup> squares, 5
- Zinc sulfate solution, ZnSO<sub>4</sub>, 0.2M, 4 mL

#### Additional Materials Required:

- Forceps or tweezers
- Marking pen
- Paper towels
- Reaction plate, 24-well
- Ruler
- Paper, blank, 1
- Sandpaper (optional)
- Distilled water and wash bottle
- Toothpicks (optional)
- Cotton swabs

### Advanced Inquiry

#### Included in Kit:

- Copper, Cu, 1 cm<sup>2</sup> strips, 5
- Copper(II) sulfate solution, CuSO<sub>4</sub>, 0.2M, 4 mL
- Iron, Fe, 1 cm<sup>2</sup> strips, 5
- Iron(II) sulfate solution, FeSO<sub>4</sub>, 0.2M, 4 mL
- Magnesium ribbon, Mg, 1 cm, 5
- Pipets, Beral-type, 5
- Magnesium nitrate solution, Mg(NO<sub>3</sub>)<sub>2</sub>, 0.2M, 4 mL
- Silver nitrate solution, AgNO<sub>3</sub>, 0.2M, 4 mL
- Zinc foil, Zn, 1 cm<sup>2</sup> squares, 5
- Zinc sulfate solution, ZnSO<sub>4</sub>, 0.2M, 4 mL

#### Additional Materials Required:

- Forceps or tweezers
- Marking pen
- Paper towels
- Reaction plate, 24-well
- Ruler
- Sandpaper (optional)
- Distilled water and wash bottle
- Toothpicks (optional)
- Cotton swabs

# INVESTIGATE DIFFERENT HYDROCARBONS

## Materials Included in Kit (for 10 groups of students)

- Alumina,  $\text{Al}_2\text{O}_3$ , 12 g
- Calcium carbide,  $\text{CaC}_2$ , 12 g
- Copper wire, Cu, 18-gauge, 92-cm
- Cyclohexane,  $\text{C}_6\text{H}_{12}$ , 50 mL
- Cyclohexene,  $\text{C}_6\text{H}_{10}$ , 50 mL
- Dibenzoyl peroxide,  $(\text{C}_6\text{H}_5\text{CO}_2)_2$ , 1.2 g
- Food dye, red, 5 mL
- Hydrochloric acid solution, 1 M, 15 mL\*
- Oil dye, blue, 10 mL
- Potassium permanganate solution, 1%,  $\text{KMnO}_4$ , 30 mL
- Sodium bromide, NaBr, 1.5 g\*
- Sodium hypochlorite solution, 30 mL\*
- Styrene,  $\text{C}_6\text{H}_5\text{CH}=\text{CH}_2$ , 50 mL
- Toluene,  $\text{C}_6\text{H}_5\text{CH}_3$ , 50 mL
- Cotton balls, package of 100
- Litmus test papers, blue, vial

\* for bromine water preparation

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The kit includes materials to conduct one of the leveled inquiry labs. The following lists convey which materials (per group) are needed for each. Both included and any additional materials that may be needed are presented.

---

### Short Inquiry

#### Included in Kit:

- Bromine water, 2 mL
- Cyclohexane, 4 mL
- Cyclohexene, 4 mL
- Food dye, red
- Oil dye, blue
- Potassium permanganate solution, 1%, 2 mL
- Toluene, 4 mL
- Litmus paper, blue

#### Additional Materials Required:

- Acetone wash bottle
- Black (UV) light
- Cork stoppers to fit test tubes, 3
- Paper towel
- Plastic pipets, disposable, or medicine droppers, 10
- Test tube rack
- Test tubes, borosilicate glass, 13 mm × 100 mm, 6
- Tweezers

### Guided Inquiry

#### Included in Kit:

- Alumina, 1 g
- Bromine water, 2 mL
- Copper wire
- Cyclohexane, 4 mL
- Cyclohexene, 4 mL
- Dibenzoyl peroxide, 0.1 g
- Food dye, red
- Oil dye, blue
- Potassium permanganate solution, 1%,  $\text{KMnO}_4$ , 2 mL
- Styrene, 1 mL
- Toluene, 4 mL
- Cotton ball
- Litmus paper, blue

#### Additional Materials Required:

- Acetone wash bottle
- Beaker, 250 mL
- Black (UV) light
- Boiling stones
- Cork stoppers to fit test tubes, 3
- Hot plate

# INVESTIGATE DIFFERENT HYDROCARBONS – continued

## Open Inquiry

### Included in Kit:

- Alumina, 1 g
- Bromine water, 2 mL
- Copper wire
- Cyclohexane, 4 mL
- Cyclohexene, 4 mL
- Dibenzoyl peroxide, 0.1 g
- Food dye, red
- Oil dye, blue
- Potassium permanganate solution, 1%, 2 mL
- Toluene, 4 mL
- Styrene, 1 mL
- Cotton ball
- Litmus paper, blue

### Additional Materials Required:

- Water
- Acetone wash bottle
- Beaker, 250 mL
- Black (UV) light
- Boiling stones
- Cork stoppers to fit test tubes, 3
- Hot plate
- Micro spatula
- Paper towels
- Pasteur pipet, glass
- Plastic pipets, disposable, or medicine droppers, 10
- Test tube rack
- Test tubes, borosilicate glass, 13 mm × 100 mm, 7
- Tweezers
- Watch glass, borosilicate glass

## Advanced Inquiry

### Included in Kit:

- Alumina, 1 g
- Bromine water, 2 mL
- Copper wire
- Cyclohexane, 4 mL
- Cyclohexene, 4 mL
- Dibenzoyl peroxide, 0.1 g
- Food dye, red
- Oil dye, blue
- Potassium permanganate solution, 1%, 2 mL
- Toluene, 4 mL
- Styrene, 1 mL
- Cotton ball
- Litmus paper, blue

### Additional Materials Required:

- Water
- Acetone wash bottle
- Beaker, 250 mL
- Black (UV) light
- Boiling stones
- Cork stoppers to fit test tubes, 3
- Hot plate
- Micro spatula
- Pasteur pipet, glass
- Plastic pipets, disposable, or medicine droppers, 10
- Paper towels
- Test tube rack
- Test tubes, borosilicate glass, 13 mm × 100 mm, 7
- Tweezers
- Watch glass, borosilicate glass

# NUCLEAR RADIATION AND SHIELDING

## Materials Included in Kit (for 8 groups of students)

- Aluminum sheets, 0.64 mm thick, 24
- Lead sheets, 1.6mm thick, 8
- Plastic mirror support, 10
- Metric ruler, transparent, 12", 10

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*The kit includes materials to conduct one of the leveled inquiry labs. The following lists convey which materials (per group) are needed for each. Both included and any additional materials that may be needed are presented.*

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### Short Inquiry

#### Included in Kit:

- Aluminum sheet, 0.64 mm thick
- Lead sheet, 1.6mm thick
- Metric ruler

#### Additional Materials Required:

- Alpha radiation source
- Paper sheet
- Radiation monitor

### Guided Inquiry

#### Included in Kit:

- Aluminum sheet, 0.64 mm thick
- Lead sheet, 1.6mm thick
- Metric ruler

#### Additional Materials Required:

- Alpha radiation source
- Beta radiation source
- Gamma radiation source
- Paper sheet
- Radiation monitor

### Open Inquiry

#### Included in Kit:

- Aluminum sheet, 0.64 mm thick
- Lead sheet, 1.6mm thick
- Metric ruler

#### Additional Materials Required:

- Alpha radiation source
- Beta radiation source
- Gamma radiation source
- Paper sheet
- Radiation monitor

### Advanced Inquiry

#### Included in Kit:

- Aluminum sheets, 0.64 mm thick, 3
- Lead sheet, 1.6mm thick
- Metric ruler

#### Additional Materials Required:

- Alpha radiation source
- Beta radiation source
- Gamma radiation source
- Paper sheet
- Radiation monitor

# HOW TO RECYCLE POLYLACTIC ACID PLASTICS

## Materials Included in Kit *(for 10 groups of students)*

- Hydrochloric acid solution, 6 M, 280 mL
- Ethyl alcohol, anhydrous, 500 mL
- Sodium hydroxide, 6 M, 400 mL
- pH test strips, pH 1-12, vial of 100
- Weighing dishes, package of 10

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*The kit includes materials to conduct one of the leveled inquiry labs. The following lists convey which materials (per group) are needed for each. Both included and any additional materials that may be needed are presented.*

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### Short Inquiry

#### Included in Kit:

- Polylactic acid cup, 2
- Aluminum evaporating dish, 20 mL

#### Additional Materials Required:

- Heat-resistant gloves
- Hot plate
- Scissors
- Small metal coin or item
- Tongs

### Guided Inquiry

#### Included in Kit:

- Hydrochloric acid solution, 6 M HCl, 20 mL
- Polylactic acid cup
- Sodium hydroxide in 1:1 ethanol/water, 1.4 M NaOH, 100 mL
- Litmus or pH testing paper
- Weighing dish

#### Additional Materials Required:

- Balance
- Beral-type plastic pipette
- Erlenmeyer flask, 250 mL
- Funnel
- Graduated cylinder, 100 mL
- Heat resistant gloves
- Ice-water bath
- Magnetic stir bar
- Paper towels
- Permanent marker
- Scissors
- Stirring hot plate
- Stirring rod
- Squirt bottle, plastic
- Thermometer or temperature sensor
- Watch glass

# HOW TO RECYCLE POLYLACTIC ACID PLASTICS – continued

## Open Inquiry

### Included in Kit:

- Hydrochloric acid solution, 6 M HCl, 20 mL
- Polylactic acid cup
- Sodium hydroxide in 1:1 ethanol/water, 1.4 M NaOH, 100 mL
- Litmus paper
- Weighing dish

### Additional Materials Required:

- Balance
- Beral-type plastic pipette
- Erlenmeyer flask, 250 mL
- Funnel
- Graduated cylinder, 100 mL
- Heat-resistant gloves
- Ice-water bath
- Magnetic stir bar
- Paper towels
- Permanent marker
- Scissors
- Stirring hot plate
- Stirring rod
- Squirt bottle, plastic
- Thermometer or temperature sensor
- Watch glass

## Advanced Inquiry

### Included in Kit:

- Hydrochloric acid solution, 6 M HCl, 20 mL
- Polylactic acid cup
- Sodium hydroxide in 1:1 ethanol/water, 1.4 M NaOH, 100 mL
- Sodium hydroxide solution, 0.1 M NaOH, 50 mL
- Litmus paper
- Weighing

### Additional Materials Required:

- Balance
- Beral-type plastic pipette
- Buret, 50 mL
- Buret clamp
- Erlenmeyer flask, 250 mL, 2
- Funnel
- Graduated cylinder, 100 mL
- Heat resistant gloves
- Ice-water bath
- Magnetic stir bar
- Paper towels
- Permanent marker
- pH meter
- Ring stand
- Scissors
- Stirring hot plate
- Stirring rod
- Squirt bottle, plastic
- Thermometer or temperature sensor
- Watch glass