

3rd Nine Weeks Review

Formula Writing & Naming

What is the name of the compound with the chemical formula CrCl_3 ?

- A) chromium tetrachloride
- B) chromium trichloride
- C) chromium(II) chloride
- D) chromium(III) chloride

Formula Writing and Naming

What is the correct chemical formula for sodium sulfate?

- A) NaSO_4
- B) Na_2SO_4
- C) $\text{Na}(\text{SO}_4)_2$
- D) $\text{Na}_2(\text{SO}_4)_2$

Formula Writing and Naming

What is the correct name for the acid whose chemical formula is H_2SO_4 ?

- A) hydrosulfuric acid
- B) hydrosulfurous acid
- C) sulfurous acid
- D) sulfuric acid

Formula Writing and Naming

What compound has the chemical formula
 MgI_2 ?

- A) di-iodide magnesium
- B) iodide(II) magnesium
- C) magnesium iodide
- D) magnesium(I) iodine(II)

Formula Writing and Naming

The correct name for $\text{Mg}_3(\text{PO}_4)_2$ is —

- A) magnesium phosphite
- B) trimagnesium phosphate
- C) magnesium(III) phosphate
- D) magnesium phosphate

Formula Writing and Naming

Which of these best describes the difference between the formulas for nitrogen monoxide and nitrogen dioxide?

- A) Nitrogen monoxide has one more atom of nitrogen.**
- B) Nitrogen dioxide has one fewer atom of oxygen.**
- C) Nitrogen monoxide has one fewer atom of oxygen.**
- D) Nitrogen dioxide has one more atom of nitrogen.**

Formula Writing and Naming

When naming a transition metal that has more than one oxidation number, the numeric value of the oxidation number is indicated by a —

A Roman numeral

B Greek prefix

C subscript

D suffix

Formula Writing and Naming

What is the chemical name for the compound



- A) Triphosphorus nitride
- B) Phosphorus(III) nitride
- C) Triphosphorus pentanitride
- D) Pentaphosphorus trinitride

Formula Writing and Naming

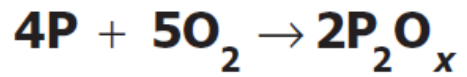
Selected Polyatomic Ions

Name	Formula
Hypochlorite	ClO^-
Chlorite	ClO_2^-
Chlorate	ClO_3^-
Perchlorate	ClO_4^-

Chlorine and bromine are in the same family in the periodic table. According to the information in the table to the left, what would be the correct formula for sodium bromate?

- A) NaBrO
- B) Na_2BrO
- C) Na_3BrO_3
- D) NaBrO_3

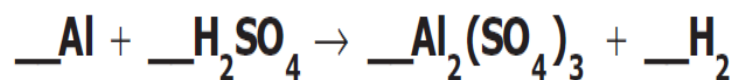
Chemical Equations



The subscript of oxygen in the product should be

- A) 2
- B) 5
- C) 10
- D) 20

Chemical Equations

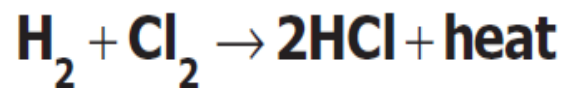


When the equation is correctly balanced, the coefficient of H_2SO_4 is

—

- A) 1
- B) 2
- C) 3
- D) 4

Chemical Equations

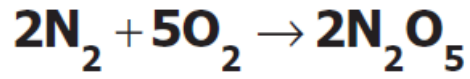


Hydrogen chloride can be formed from hydrogen and chlorine as shown in the reaction.

Chlorine and fluorine are located in the same group in the periodic table. If the reaction were performed with fluorine instead of chlorine, how many moles of H_2 would be required to balance the equation?

- A) 1
- B) 2
- C) 4
- D) 8

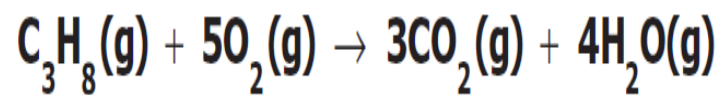
Chemical equations



What mass of nitrogen is required to react with 16 grams of oxygen?

- A) 2.8 g
- B) 5.6 g
- C) 14 g
- D) 56 g

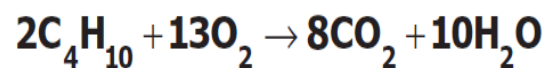
Chemical Equations



If 5.0 moles of react, how many molecules of water are formed?

- A) 3.0×10^{24}
- B) 4.8×10^{24}
- C) 1.2×10^{25}
- D) 2.4×10^{25}

Chemical Equations



The equation shows the combustion of butane (C_4H_{10}). How many moles of water can be produced by 12.5 moles of C_4H_{10} with excess oxygen?

- A) 2.50 mol
- B) 62.5 mol
- C) 125 mol
- D) 202 mol

Chemical Equations



Which of these sets of coefficients will balance this equation?

A) 3, 3, 2, 1

B) 3, 1, 3, 1

C) 1, 6, 1, 9

D) 9, 3, 3, 3

Chemical Equations

When magnesium metal (Mg) is burned, it forms MgO. How many moles of oxygen gas (O_2) are needed to burn 10 moles of Mg?

A) 2

B) 5

C) 10

D) 20

Chemical equations

Which statement is true for the reaction represented by this equation?



- A) 1 gram of CH_4 is required to react with 2 grams of O_2 .
- B) 1 gram of CH_4 is required to react with 4 grams of O_2 .
- C) 1 mole of CH_4 is required to react with 2 moles of O_2 .
- D) 1 mole of CH_4 is required to react with 4 moles of O_2 .

Chemical Reactions

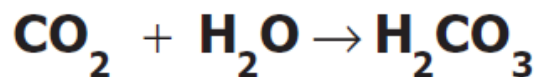
Consider this incomplete chemical equation:



What are the products of this equation?

- A) BaCl_2 and CuCl_2
- B) BaCuCl_2 and Ba
- C) BaCl_2 and Cu
- D) BaCu and Cl_2

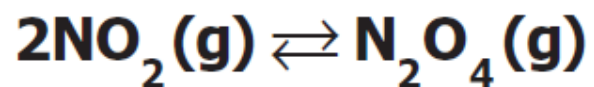
Chemical Reactions



The reaction is which type of chemical reaction?

- A) Single replacement
- B) Double replacement
- C) Synthesis
- D) Decomposition

Chemical Reactions



NO_2 and N_2O_4 undergo the reaction shown. When a sealed container of reaches chemical equilibrium, which must be true?

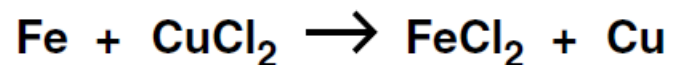
- A) No N_2O_4 is present.
- B) No chemical reactions are occurring.
- C) The rates of the forward and reverse reactions are equal.
- D) The maximum number of molecules has been reached.

Chemical Reactions

A balanced chemical equation has equal numbers of atoms of each type on both sides of the equation. This illustrates the principle of —

- A) conservation of energy**
- B) conservation of mass**
- C) action and reaction**
- D) natural selection**

Chemical Reactions



The type of reaction represented by the above equation is —

- A) single-replacement
- B) double-replacement
- C) synthesis
- D) decomposition

Chemical Reactions

The role of a catalyst is to affect —

A) electronegativity

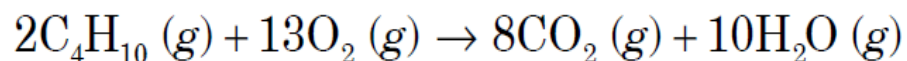
B) heat content

C) activation energy

D) ionization energy

Chemical Reactions

This balanced equation represents a chemical reaction.



What type of chemical reaction is represented by the equation?

- A combustion
- B decomposition
- C double replacement
- D single replacement

Chemical Reactions

What is the *best reason for using iron* filings instead of an iron nail in a chemical reaction?

A to decrease the amount of catalyst during the reaction

B to increase the molecular structure during the reaction

C to decrease the rate of reaction

D to increase the surface area of the reaction

Chemical Reactions

Different amounts of ammonia gas (NH_3) and hydrogen chloride gas (HCl) are combined in the laboratory. Some of the masses of the reactants and the products for two trials are shown below.

Experimental Masses of Ammonia and Hydrogen Chloride

Trial	Mass NH_3	Mass HCl	Mass NH_4Cl
1	3.40 g	7.30 g	10.70 g
2	?	?	32.10 g

Based on the Law of Constant Composition, which of the following values correctly replace the question marks?

- A) 6.42 g of NH_3 and 25.68 g of HCl
- B) 8.50 g of NH_3 and 18.25 g of HCl
- C) 10.20 g of NH_3 and 21.90 g of HCl
- D) 16.05 g of NH_3 and 16.05 g of HCl

Changes in Matter/Energy

What can be said of a closed system when an exothermic reaction proceeds in an aqueous solution?

- A) There is a net energy loss.
- B) There is a net energy gain.
- C) Heat is transferred from the water to the reactants.
- D) Heat is transferred from the reactants to the water.

Changes in Matter/Energy

Which statement describes the transfer of heat energy that occurs when an ice cube is added to an insulated container with 100 milliliters of water at 25°C?

- A) Both the ice cube and the water lose heat energy.
- B) Both the ice cube and the water gain heat energy.
- C) The ice cube gains heat energy and the water loses heat energy.
- D) The ice cube loses heat energy and the water gains heat energy.

Changes in Matter/Energy



The general equation shown is a reaction that is an-

- A) Exothermic decomposition
- B) Endothermic decomposition
- C) Endothermic synthesis
- D) Exothermic synthesis

Changes in Matter/Energy

To determine if a reaction is exothermic, a student should use a –

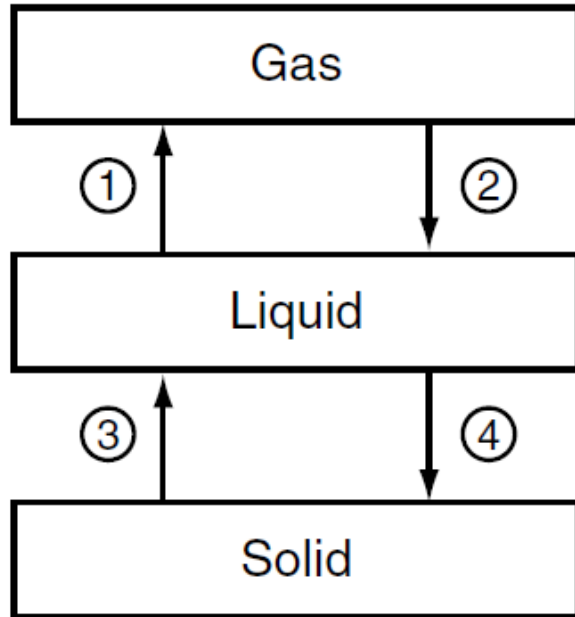
- A) pH probe
- B) Motion sensor
- C) Pressure sensor
- D) Temperature probe

Changes in Matter/Energy

Which of these best describes sublimation?

- A) A solid changing to a liquid phase**
- B) A solid changing to a gaseous phase**
- C) A gas filling the space in its container**
- D) A liquid taking the shape of its container**

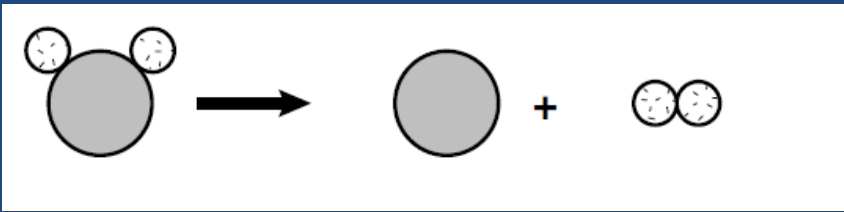
Changes in Matter/Energy



Which numbered process represents condensation?

- A) 1**
- B) 2**
- C) 3**
- D) 4**

Changes in Matter/Energy

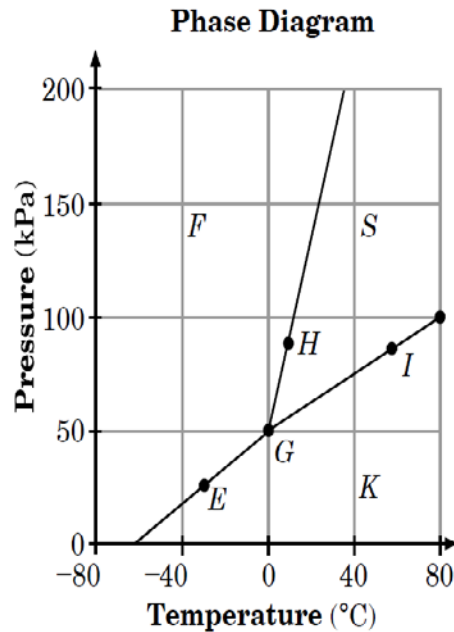


What type of reaction does this illustration represent?

- A) Decomposition
- B) Synthesis
- C) Single-replacement
- D) Double-replacement

Changes in Matter/Energy

This graph represents a phase diagram for a substance.



What is the state of the substance at point *I*?

A gas

B liquid

C liquid and gas

D solid and liquid

Changes in Matter/Energy Changes

As heat is added to a substance undergoing a phase change, the temperature remains constant because the energy is being used to-

- A) Break covalent bonds
- B) Lower the specific heat capacity
- C) Overcome intermolecular forces
- D) Oppose electron cloud repulsions

Solutions

A student hypothesizes that the solubility of a particular solute in water is nearly constant as temperature varies. The student can best test the hypothesis by doing which of the following?

- A) Researching the chemical properties of many different solutes
- B) Measuring the solubility of the solute at five different temperature
- C) Drawing diagrams of the molecular structures of water and of the solute
- D) Measuring the solubility of several different solutes at a fixed temperature

Solutions

Which of the following is a solid/solid solution?

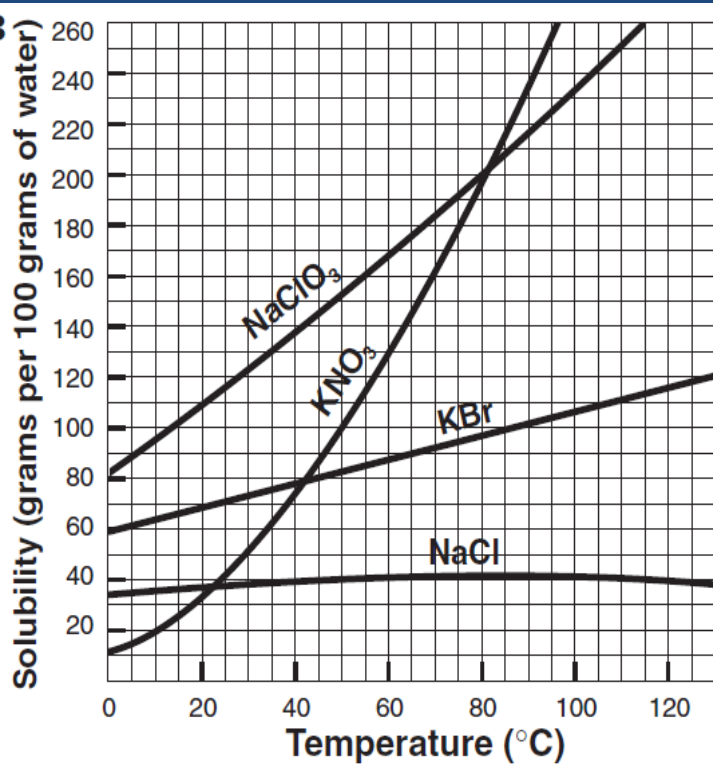
- A) An alloy of gold and copper
- B) A mixture of argon and krypton
- C) A strongly electrolytic acid
- D) A neutralized base

Solutions

Soda water is a solution of carbon dioxide in water. This solution is composed of a —

- A gaseous solute in a gaseous solvent**
- B liquid solute in a liquid solvent**
- C gaseous solute in a liquid solvent**
- D liquid solute in a gaseous solvent**

Solutions



Which salt is most soluble in water at 90 C?

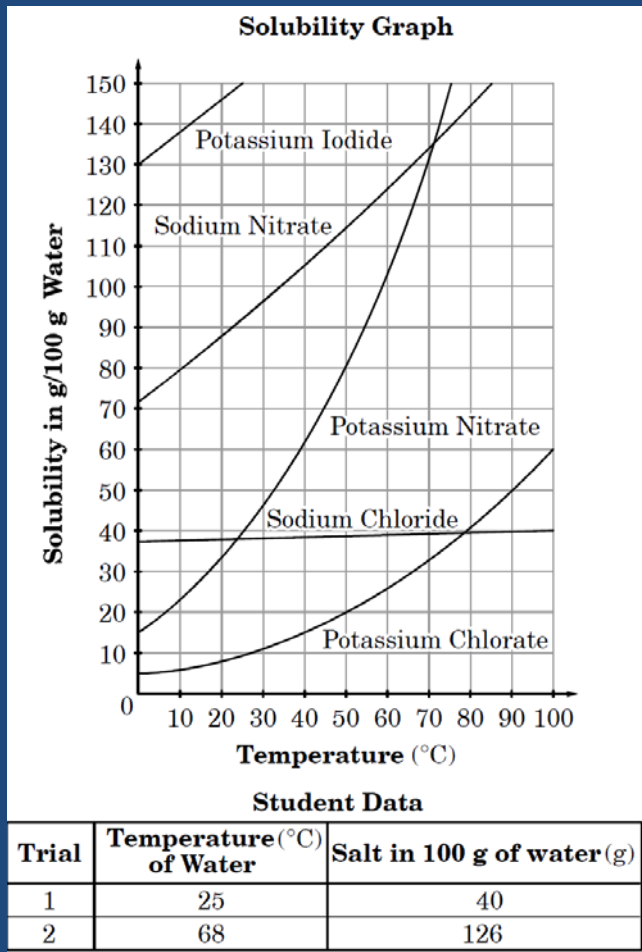
A NaClO₃

B KNO₃

C KBr

D NaCl

Solutions



Using the solubility graph provided, a student performs an experiment to find the solubility of a substance. The student finds the amount of substance needed to make a saturated solution in 100 g of water at different temperatures. The student's data are shown in the table below the graph

What is the identity of the substance?

- A Sodium Nitrate
- B Potassium Nitrate
- C Sodium Chloride
- D Potassium Chlorate

Solutions

An ice-skating rink has tubes under its floor to freeze the water. Salt water is cooled well below the freezing point of water and pumped through the tubes to freeze the water in the rink. Why can the salt water be cooled so low without freezing?

- A) Salt has a very low freezing point.**
- B) Adding salt to water lowers its freezing point.**
- C) Movement of the salt water through the tubes keeps it in the liquid state.**
- D) The salt water is constantly absorbing energy from its surroundings.**

Solutions

A solution which has a concentration that exceeds its predicted solubility at a certain temperature and pressure would be —

A unsaturated

B saturated

C supersaturated

D dilute

Solutions

Which of the following samples of sugar will dissolve fastest in a pitcher of lemonade?

- A) 5 g of cubed sugar in 5° C lemonade
- B) 5 g of cubed sugar in 20° C lemonade
- C) 5 g of granulated sugar in 5° C lemonade
- D) 5 g of granulated sugar in 20° C lemonade

Water

An insect known as a water strider can walk across the surface of a pond. Which of the following is directly responsible for this insect being able to walk on the surface without sinking?

- A) Ionic bonding
- B) Oxygen bonding
- C) Hydrogen bonding
- D) Nonpolar covalent bonding

Water Properties

The relatively high boiling point of water is due to water having

- A) hydrogen bonding
- B) metallic bonding
- C) nonpolar covalent bonding
- D) strong ionic bonding

Solid, Liquid, Gas

A gas enters a compressor where it is converted to a liquid. Which of the following happens to the gas as it becomes a liquid?

- A) It loses mass
- B) It releases heat
- C) It loses protons
- D) It releases electricity

Solids, Liquids, and Gases

Water molecules have the *greatest* kinetic energy in —

A) ice at 0C

B) water at 373 K

C) water at 98C

D) steam at 150C

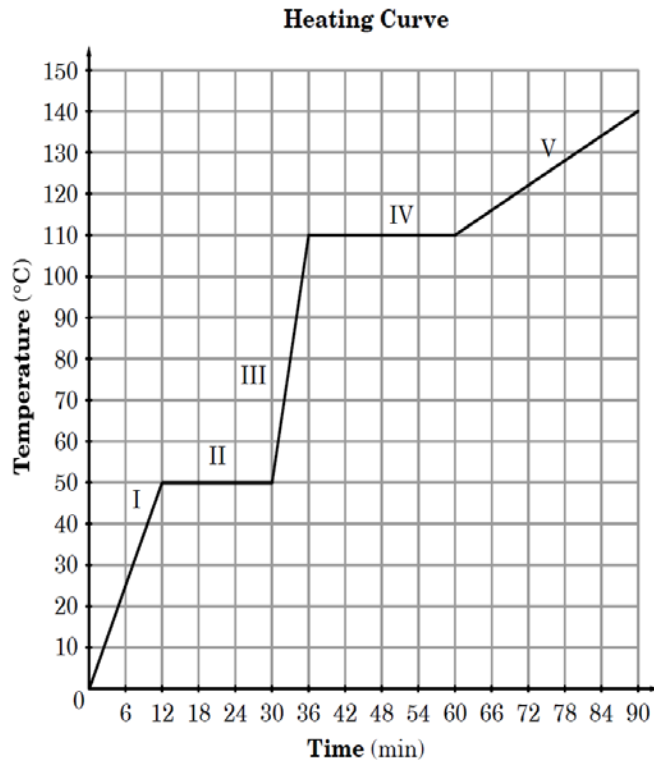
Solids, Liquids, and Gases

Which of the following correctly pairs a phase of matter with its description?

- A) Solid: particles have no motion
- B) Liquid: particles expand to fill any container in which they are placed
- C) Gas: particles have higher amounts of energy than when in the liquid phase
- D) Liquid: particles are more strongly attached to one another than when in the solid phase

Solids, Liquids and Gases

This graph represents a heating curve of a substance.



Which region on the graph represents the solid phase?

A I

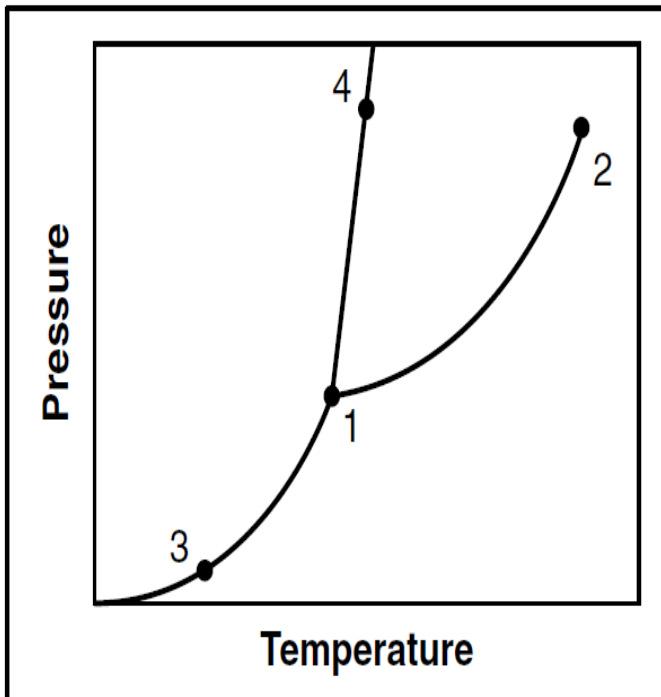
B II

C III

D IV

Solids, Liquids, Gases

Phase Diagram



The graph shows the phase diagram of a substance. At which point on the diagram do the solid, liquid, and gas phases coexist simultaneously?

- A) 1
- B) 2
- C) 3
- D) 4

Solids, Liquids and Gases

Molar Heat of Vaporization

H ₂ O	40.7 kJ/mole
NH ₃	23.4 kJ/mole

Water and ammonia have different molar heats of vaporization. The best interpretation, at the molecular level, is that water molecules —

- A) have stronger intermolecular attractions
- B) occupy larger molecular volumes
- C) set up stronger repulsive nuclear forces
- D) collide more frequently with each other