High School Chemistry

Revision Questions

UNIT 2: CHEMICAL BONDING

1. What is the name given to the forces that keep molecules together?

2. What is the name given to the forces that keep atoms within a molecule together?

3. What are Ionic Bonds?

4. List properties of ionic compounds.

5. What are covalent bonds?

6. List properties of Covalent bonds.

7. Discuss why larger molecules have greater London Dispersion Forces than smaller molecules?

8. Describe Intermolecular dipole-dipole forces

9. List elements that can form hydrogen bonds

10. Describe metallic bonding.

11. List intermolecular forces and rank them from the strongest to the weakest?

12. If substance A has a higher melting and boiling point than substance B, what can you say about the substances' intermolecular forces?

UNIT 3. FORMS OF MATTER

1. What is the pressure required to compress hydrogen at 1.00 atm from 300 mL to 200 mL at a constant temperature?

2. A 400 mL sample of a gas at 10 °C is warmed to 25 °C at a constant pressure. Calculate the final volume.

3. A bicycle tire has a pressure of 450 kPa at 20 °C. Assuming the volume does not change, what is the new pressure at 35 °C?

4. A 450 mL sample of freon gas at 1.50 atm and 15 °C was compressed to 300 mL at a pressure of 2.00 atm. Calculate the final temperature in °C.

5. Calculate the mass of neon gas in a neon sign with a volume of 50 L at 10 °C and 3.1kPa.

6. Calculate the volume of 8.4 g of nitrogen at 200°C and 130 kPa.

7. Calculate the volume of 16 g of oxygen at 22°C and 97.5 kPa.

8. Hydrogen gas is generated by the decomposition of water to fill a 1.1 kL weather balloon at 20°C and 100 kPa. What is the mass of hydrogen required?

9. What is the volume of 0.43 g of methane (CH4) at 22°C and 100 kPa?

10. How would you determine the molar mass of an unknown pure gas?

11. What does absolute zero mean?

12. What would be the new volume of oxygen gas when pressure remains constant if the temperature changed from 39 °C to 55 °C and its initial volume was 685 ml?

13. What would be the final temperature of a gas (in °C) if the pressure went from 780 mm Hg to 150.8 kPa and had an initial temperature of 26 °C?

14. A sample of argon gas occupies a volume of 2.0 L at -35°C at 1.2 atm. What would its Celsius temperature be at 2.0 atm if its volume decreases to 1.5 L?

15. What mass of sulfur gas would be found in a 2.45 liter container at SATP?

UNIT 4: STOICHIOMETRY

1. List three properties of acids and bases each.

2. What is the difference between strong acids and weak acids?

3. What is the difference between strong bases and weak bases?

4. What is the difference between a diluted acid and a concentrated acid?

5. Write ionization equation for the following:

a. Hydrochloric acid

b. Boric acid

c. Acetic acid

d. Sulfurous acid

e. Hydrosulfuric acid

f. hydrocyanic acid

6. Predict the pH by combing 75.0 ml of hydroiodic acid with a pH of 4.50 and 175.0 ml of hydroiodic acid with a pH of 3.25.

7. Predict the pH of the solution made by dissolving 925 mg of nitric acid in enough water to make 850 mL.

8. How much solvent will you have to add to 150 ml of perchloric acid that has a pH of 3.500 to change it to a pH of 4.000?

9. Estimate the mass of acetic acid that was neutralized with 25.6 ml at 0.850 mol/L with barium hydroxide

10. What volume of 0.500 mol/L carbonic acid can be neutralized completely with 175 g of aluminum hydroxide?

11. Define the following:

a. Acid according to Arrhenius

b. Base according to Arrhenius

c. Acid according to Bronsted-Lowry

d. Base according to Bronsted-Lowry

12. How many moles of hydrogen gas are produced if 0.500 mol of water are decomposed?

13. Sulfur reacts with barium oxide to produce barium sulfide and oxygen gas.

a. How many moles of elemental sulfur are needed if 2.00 mol of barium oxide are used?

b. How many moles of barium sulfide are produced from 0.100 mol of sulfur?

14. The combustion of methane gas takes place in the presence of oxygen gas to produce carbon dioxide and water vapor (the compounds produced when you burn a hydrocarbon)

a. How many moles of oxygen gas are needed to completely burn 3.00 mol of methane gas?

b. How many moles of water vapor are produced from 0.0400 mole of methane gas?

15. Iron (II) phosphate reacts with tin (IV) nitride to produce iron (II) nitride and tin (IV) phosphate.

a. How many moles of tin (IV) nitride are needed to produce 0.500 mol of iron (II) nitride?

b. How many moles of iron (II) phosphate are used when 0.045 mol of tin (IV) nitride also react?

16. When an excess of silver reacts with 3.45 moles of zinc phosphate, what mass of silver phosphate would be produced?

17. In neutralization of sulfuric acid solution, 4.56 mol of sodium hydroxide was used. What mass of water would be produced in this reaction?

18. When 6.5 mol of potassium chlorate solid breaks down to the simpler compound of potassium chloride and oxygen gas, what mass of KCl (s) would be produced?

19. When iron (II) hydroxide reacts with cobalt (II) phosphate, iron (II) phosphate and cobalt (II) hydroxide are formed. If 3.00 mol of iron (II) hydroxide react, what mass of cobalt (II) phosphate is needed?

20. For each of the following questions indicate which reactant is the limiting reagent, and which is the reagent in excess. You may need to complete a balanced chemical equation before answering the question.

a. 25 grams of zinc reacts with 75 g of nitric acid. What mass of zinc nitrate is produced?

b. 15 g of sodium hydroxide reacts with 26 g of hydrochloric acid. What mass of sodium chloride is produced?

c. 2.0 g of methane reacts with 7.0 g of oxygen. How many grams of carbon dioxide is produced?

21. When 84.8 g of iron(III) oxide react with an excess of carbon monoxide, then 57.8 g of iron are produced. $Fe_2O_3(s) + 3CO(g) \rightarrow 2Fe(s) + 3CO_2(g)$

What is the percent yield of this reaction?

UNIT 6: ELECTROCHEMICAL CHANGES

1. Which of the following statements is an operational definition of the metal undergoing reduction?

A. Iron metal undergoes a formation reaction with oxygen gas.

B. Magnesium metal increases in mass when heated in air.

C. Iron(III) hydroxide reacts with oxygen in the air to form ionic compounds.

D. Zinc sulfide ore is roasted in the presence of oxygen gas to produce zinc metal.

2. A student wants to store a Tin (II) chloride solution in a container made of either iron, zinc, aluminium, or copper.

Design an experiment that will enable you to determine which type of container "iron, zinc, aluminium, or copper" is best to use in terms of reactivity for storing a tin(II) chloride solution.

Your response should include

★an explanation and rationale to support your choice

★relevant half-reaction equations

★two other criteria you would use, other than reactivity, to determine the best storage container.

3. The anode of an electrochemical cell is the site at which -

A. oxidation occurs

B. cations gain electrons

C. cations are attracted to the electrode

D. electrons are attracted to the electrode

4. An electrolytic cell differs from a voltaic cell in that the electrolytic cell-

A. is spontaneous

B. consumes electricity

C. has a positive E^o cell value

D. has an anode and a cathode

UNIT 7: ORGANIC CHEMISTRY

1. a. Draw and name a five-carbon organic compound. Identify if the compound you drew is saturated or unsaturated.

b. Draw and name a structural isomer of the compound that you drew above.

2. a. Name and draw three hydrocarbons.

b. Describe a physical, chemical, or technological process that could be used to separate a mixture of hydrocarbons.

3. When methanol and ethanoic acid react, the products are:

A. ethyl methanoate only

B. methyl ethanoate only

C. ethyl methanoate and water

D. methyl ethanoate and water