

Name: \_\_\_\_\_

### Practice Problems

1. Monica makes the following observations on an object:

- I- Volume: 12.0 mL
- II- Length: 12.0 cm
- III- Mass: 1.25 g
- IV- Melting point: 450° C

Which observation is a *characteristic* property?

- a) I      b) II      c) III      d) IV
- 

2. Which of the following properties indicates an object is a *non metal*?

- a) It is chrome in color                      c) It is a good insulator  
b) It is shinny                                      d) It is malleable
- 

3. Which of the following are *physical* changes?

- 1- Burning gasoline
- 2- Crushing a rock
- 3- Cutting grass
- 4- Iron rusting
- 5- Water evaporating

- a) 1,4      b) 1,4,5      c) 2,3      d) 2,3,5

4. Alison decomposes a sample of matter into different substances. The original substance was not a/an:

- a) compound      b) element      c) solution      d) mixture
- 

5. Which of the following does not represent a compound?

- a) O<sub>2</sub>      b) H<sub>2</sub>O      c) CO<sub>2</sub>      d) CH<sub>4</sub>
- 

6. A certain gas extinguishes a candle flame immediately. It had no effect on lime water and copper did not change when heated in the gas. Which of the following could it be?

- a) Air      b) Nitrogen      c) Carbon dioxide      d) Oxygen

7. A chemical change must *necessarily* produce which of the following?

- a) A mixture                                      b) A new substance  
c) A solution                                      d) A change of state
- 

8. What is the *mass number* of an element that has 26 protons, 26 electrons, and 30 neutrons?

- a) 30      b) 52      c) 56      d) 82
-

9. Which of the following indicates that a **chemical change** is taking place?

- 1- A gas is released
- 2- A precipitate is formed
- 3- The mass is conserved (remains the same)
- 4- A solute dissolves completely
- 5- The color changes
- 6- The number of atoms is conserved

- a) 2,3,4      b) 1,2,5      c) 1,4,6      d) 3,5,6
- 

10. An ion is an atom that:

- a) is electrically neutral
  - b) has lost or gained one or more electrons
  - c) has lost or gained one or more protons
  - d) has lost or gained one or more neutrons
- 

11. An atom consists of 23 protons, 23 electrons and 28 neutrons. What is its mass number?

- a) 23      b) 28      c) 46      d) 51

12. Which of the following statements correctly describes Rutherford's model of the atom?

- a) made up of indivisible particles
  - b) a sphere containing evenly distributed positive and negative charges
  - c) a sphere in which the positive charges are concentrated in the nucleus with the negative charges outside the nucleus.
  - d) A sphere containing evenly distributed positive and negative particles in the nucleus.
- 

13. An atom consists of 23 protons, 23 electrons and 28 neutrons. What is its atomic number?

- a) 23      b) 28      c) 46      d) 51
- 

14. The number of valence electrons contained in an atom of lithium is:

- a) 1      b) 2      c) 3      d) 4
- 

15. To which family of the periodic table does potassium, belong?

- a) The inert gases
  - b) The halogens
  - c) The alkali metals
  - d) The alkaline-earth metals
- 

16. The atomic number of magnesium is 12. How many protons and valence electrons respectively does magnesium have?

- a) 12 and 12
- b) 12 and 0
- c) 12 and 2
- d) 2 and 12

17. What is the maximum number of electrons which can fit on the second energy level (or shell)?

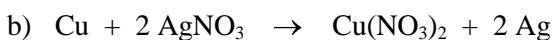
- a) 2      b) 8      c) 18      d) 32

18. Using the given symbols for the hydrogen, oxygen and carbon atoms, draw the molecule of each substance below.

○ Hydrogen    ● Oxygen    ● Carbon

<i>Water</i>	<i>Hydrogen gas</i>	<i>Oxygen gas</i>
<i>Carbon dioxide</i>	<i>Carbon tetrahydride (methane gas)</i>	<i>Carbon monoxide</i>

19. Draw a ball and stick model of the following equation.



20. Why are the columns in the periodic call families?

21. Identify the family with the following characteristic and state their column number. (3 marks)

- |   |                |
|---|----------------|
| a) Doesn't react with anything. _____         | column # _____ |
| b) Can be used to form acids and salts. _____ | column # _____ |
| c) Is extremely reactive with water. _____    | column # _____ |
| d) Is a powerful disinfectant. _____          | column # _____ |

22. Classify the following changes as *physical* or *chemical*:

- |                         |       |
|-------------------------|-------|
| a) digestion of food    | _____ |
| b) oxidation            | _____ |
| c) growth of a plant    | _____ |
| d) melting of ice       | _____ |
| e) neutralization       | _____ |
| f) healing of a wound   | _____ |
| g) drying of paint      | _____ |
| h) dissolving of sugar  | _____ |
| i) baking of bread      | _____ |
| j) formation of dew     | _____ |
| k) fermentation of wine | _____ |
| l) boiling of water     | _____ |

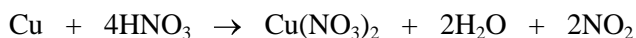
22. State the number of each different types of atoms in each of the following compounds.

- |  |          |         |         |         |
|--|----------|---------|---------|---------|
| a) $\text{H}_2\text{SO}_4$               | H _____  | S _____ | O _____ |         |
| b) $\text{NH}_4\text{OH}$                | N _____  | H _____ | O _____ |         |
| c) $\text{Ca(HCO}_3)_2$                  | Ca _____ | H _____ | C _____ | O _____ |
| d) $\text{CH}_3\text{COOH}$              | C _____  | H _____ | O _____ |         |
| e) $(\text{NH}_4)_2\text{C}_2\text{O}_4$ | N _____  | H _____ | C _____ | O _____ |

23. Balance the following chemical equations and name the type of reaction.

Equations	Types of reaction
1. $\text{Fe}_{(s)} + \text{O}_{2(g)} \rightarrow \text{Fe}_2\text{O}_{3(s)}$	_____
2. $\text{H}_2\text{O}_{(l)} \rightarrow \text{H}_{2(g)} + \text{O}_{2(g)}$	_____
3. $\text{KOH}_{(s)} + \text{H}_2\text{SO}_{4(aq)} \rightarrow \text{K}_2\text{SO}_{4(aq)} + \text{H}_2\text{O}_{(l)}$	_____
4. $\text{CuSO}_{4(l)} + \text{NaOH}_{(l)} \rightarrow \text{Cu}(\text{OH})_{2(\text{ppt})} + \text{Na}_2\text{SO}_{4(s)}$	_____

24. When 191 g of copper, Cu, is combined with 756 g of nitric acid, HNO<sub>3</sub>, the chemical reaction produces 563 g of copper nitrate, Cu(NO<sub>3</sub>)<sub>2</sub>, 108 g of water, H<sub>2</sub>O, and a certain amount of nitrogen dioxide, NO<sub>2</sub>. This reaction is represented by the following balanced chemical equation:



- What mass of nitrogen dioxide does this reaction produce?
- What is the ratio of the reactants used?

25. Anna Banana needs to neutralize a window-cleaner that contains ammonia. When she tests it with red litmus paper, the paper turns blue.

- What type of substance must she use to neutralize the cleaner? \_\_\_\_\_
- What will 2 compounds will be produced after she neutralizes it? \_\_\_\_\_

26. In the laboratory, you are to neutralize an acid solution before disposing of it. Explain in detail how you would neutralize this solution. In your explanation, indicate the **material used and the steps involved**.

27. What are electrolytes?

28. What are ions?

29. How many electrons do the following ions have: Ca<sup>2+</sup>, C<sup>4-</sup>, O<sup>2-</sup>, K<sup>+</sup>

30. Are the following acids, bases, salts or neither? If they are electrolytes, what is their ionic dissociation?

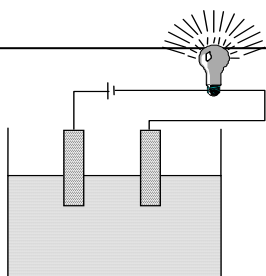
#### Ionic Dissociation

- |                      |       |       |
|----------------------|-------|-------|
| a) HBr               | _____ | _____ |
| b) H <sub>2</sub> O  | _____ | _____ |
| c) HCl               | _____ | _____ |
| d) CaCl <sub>2</sub> | _____ | _____ |
| e) NaOH              | _____ | _____ |

31. The following diagram shows 3 solutions being tested for electric conductivity with a conductivity meter.

Explain **why** and **how** the light bulb lights up for each sample being tested. You must refer to

- The nature of the solution.
- Ionic dissociation.
- The nature of the materials used in the conductivity meter.
- The components or construction of the conductivity meter.


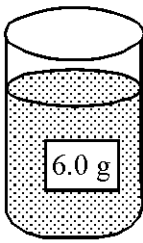
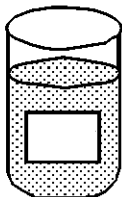
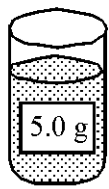


**NaOH<sub>(aq)</sub>**

32. Convert the following concentration into ppm.

- a)  $\frac{4 \text{ g}}{\text{L}}$
- b)  $\frac{5 \text{ g}}{\text{kg}}$
- c)  $\frac{0.06 \text{ g}}{100 \text{ mL}}$
- d)  $\frac{0.7 \text{ g}}{100 \text{ g}}$

33. Consider the 4 solutions below :

Solution	Solution	Solution	Solution
			
100 mL	3 L	4000 ppm	200 mL

List the solutions from least to most concentrated.

34. What type of energy are the following objects associated with? (2 marks)

- a. Solar panel \_\_\_\_\_
- b. Eating food \_\_\_\_\_
- c. Hydroelectric Dams \_\_\_\_\_
- d. Batteries \_\_\_\_\_

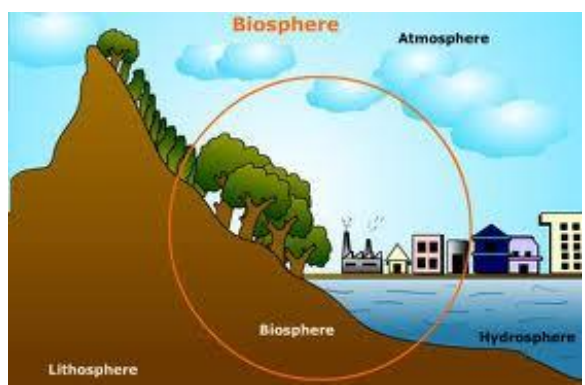
35. A car consumed 2000 kJ of energy.

- a) If its efficiency is only 15%, how much energy is actually used to move the car? Show all your work. (3 marks)
- b) If the car consumes triples the amount of energy, how much energy is actually used to move the car? Show all your work. (2 marks)

36. What type of energy are the following objects associated with?

- Solar panel
- Atoms
- Candle
- Food
- Dams
- Wind mill

37. Which part of the Earth is represented by the following letters in the picture below?



A

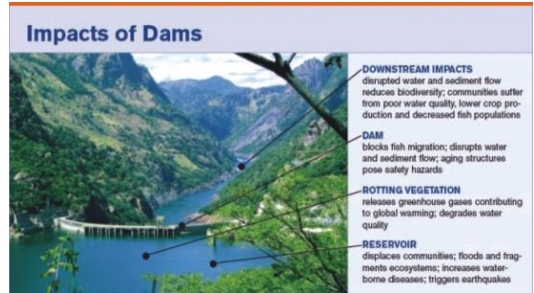
B

38. What type of energy resource is associated with the following pictures? Explain how you know. Where does the energy resource come from?

A)



B)



39. What are the 3 types of rocks? Give an example of each one and state its use.

40. What type of chemical reaction is the combustion of fossil fuels? Write the chemical equation for it.