 

Review of Ch. 1 Elements and Compounds

* **Knowledge** can be classified as empirical (observable) or theoretical (based on ideas).

1. *Classify the following statements as examples of empirical or theoretical knowledge.*

Atoms and ions were rearranged. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

A yellow precipitate formed. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* **Matter** can be classified as pure substances (elements or compounds) and homogeneous or heterogeneous mixtures.

2. *Classify the following entities as an element, compound or mixture.*

sucrose \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ palladium \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ milk \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* The **Periodic Table** organizes the known elements by horizontal rows called periods and by vertical columns called groups or families.

3. *The family of elements listed in Group 2 of the periodic table are the* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

4. *The family of elements that are soft, silver-colored conductors of electricity that react violently with water and form 1+ ions are the* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

5. *The halogen family includes non-metal elements that are very reactive and form* \_\_\_\_\_\_ *ions*.

* **Atomic Theories** explain the periodic table and describe the structure of atoms.

6. *Lead has \_\_\_\_\_ occupied energy levels and \_\_\_\_\_ valence electrons.*

7. *The radioactive isotope of carbon, carbon-14, has \_\_\_ protons, \_\_\_ electrons and \_\_\_ neutrons.*

8. *Write the isotope notation for lithium-7.*

9. *Draw energy-level diagrams to represent the reaction of magnesium and oxygen to form*

*magnesium oxide.*

10. *Give the name and symbol for an entity containing 80 electrons and 82 protons.*

11. *Complete the following table.*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Symbol** | **Name** | **# protons** | **# electrons** | **Net Charge** |
|  | sulfide ion |  |  |  |
|  |  | 35 | 36 |  |
| Ca2+ |  |  |  |  |
|  |  | 23 | 23 |  |
|  |  | 26 |  | 3+ |
|  |  |  | 18 | 0 |

* **Ionic Compounds** contain metals and non-metals and are formed when a positive **cation** is strongly attracted to a negative **anion** with an ionic bond produced by a transfer of electrons.

12. *Write an unbalanced chemical equation from the following word equation:*

sodium oxalate + calcium hydroxide → calcium oxalate + sodium hydroxide

13. *Write a word equation using IUPAC names for the following chemical equation:*

NiS(aq) + Al(NO3)3(aq) → Ni(NO3)2(aq) + Al2S3(s)

14. *The IUPAC name for FeSO4•7H2O(s) is* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

* **Molecular Compounds** contain only non-metal atoms held together by covalent bonds produced by a sharing of electrons.

15. *Provide the chemical formulas with states of matter for the following molecular substances.*

chlorine \_\_\_\_\_\_\_\_\_\_ phosphorus \_\_\_\_\_\_\_\_\_\_

sulfur dioxide \_\_\_\_\_\_\_\_\_\_ methane \_\_\_\_\_\_\_\_\_\_

ammonia \_\_\_\_\_\_\_\_\_\_ dinitrogen tetraoxide \_\_\_\_\_\_\_\_\_\_

16. *Write a word equation using IUPAC names for the following chemical equation:*

C2H5OH(l) + O2(g) → CO2(g) + H2O(g)

Review of Ch. 2 Chemical Reactions

* Most STS issues can be discussed from many points of view, or **perspectives**, such as the five

“STEEP” perspectives:

-**S**cientific dealing with research and explanation of phenomena

-**T**echnological concerned with the use of machines, instruments and processes

-**E**cological considers relationships between living organisms and the environment

-**E**conomic focuses the production, distribution and consumption of wealth

-**P**olitical involves vote-getting actions and measures

17. *Classify the perspective demonstrated by the following statement – “Extensive studies have*

*found that dioxins are among the most persistent pollutants on Earth and have been found in the*

*tissues of polar bears, seals, tropical birds, dolphins and humans.”* ­­­­­­­­­­

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* Kinetic molecular theory (KMT) and collision reaction theory can be used to explain how chemical reactions occur and **balanced chemical equations** can be written to describe reactions.

18. *Changes in matter can be classified as physical, chemical or* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ *changes.*

19. *Use whole number coefficients to balance the following chemical reaction:*

\_\_\_\_C3H8(g) + \_\_\_\_O2(g) → \_\_\_\_CO2(g) + \_\_\_\_H2O(g)

20. *Write a balanced chemical equation for the reaction of calcium chloride solution with sodium phosphate solution to produce a precipitate of calcium phosphate and aqueous sodium chloride.*

* The **mass** of a substance measured in grams can be converted into a **chemical amount** in moles using the **molar mass** as a conversion factor.

or m = n M

21. *Calculate the mass of fuel burned when an alcohol lamp burns 2.50 mol of methanol.*

22. *Determine the chemical amount of ammonium sulfate fertilizer in a mass of 150 g.*

* The 5 most common types of chemical reactions include:

i) **formation** (elements → compound)

ii) **simple decomposition** (compound → elements)

iii) **combustion**  (fuel + oxygen → most common oxides)

iv) **single replacement** (element + compound → element + compound)

v) **double replacement** (compound + compound → compound + compound)

* The **solubility** of ionic compounds formed in single and double replacement reactions can be predicted using the solubility table on page six of the data booklet. Molecular fuels and all elements except chlorine have low solubility in water.

23. *Complete and balance the following chemical reactions and identify each as one of the five main types of reactions.*

a) Al2O3(s) →

b) C8H18(l) + O2(g) →

c) Cu(NO3)2(aq) + NaOH(aq) →

d) Fe(s) + Br2(l) →

e) Al(s) + ZnSO4(aq) →

24. *Write the chemical formula of the following substances including a state of matter that describes the solubility of each in pure water.*

a) sucrose e) ammonium nitrate

b) methane f) sulfur

c) calcium sulfate g) ammonia

d) carbon h) chlorine