Some Basic Concepts of Chemistry

Assertion Reason Questions

In the following question no. (7-9), a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choices:

(a) Both (A) and (R) are true and (R) is the correct explanation of (A).
(b) Both (A) and (R) are true but (R) is not the correct explanation of (A).
(c) (A) is true but (R) is false.
(d) (A) is false but (R) is true.

1. Assertion (A): 22 carat gold is a mixture.
Reason (R): A compound has a fixed composition of the elements present in it.

Ans. (b) Both (A) and (R) are true but (R) is not the correct explanation of (A).
Explanation: 22 carat gold is a homogeneous mixture in which gold is mixed with a small amount of copper or silver. So, the assertion is correct. But it is not a compound since it is not formed by combination of elements in a fixed ratio by mass.

2. Assertion (A): The standard unit of expressing mass of atoms is called 'u'.
Reason (R): 'u' represents unit mass.

Ans. (c) (A) is true but (R) is false.
Explanation: The standard unit of expressing mass of atoms is called 'u' where u represents unified mass and not unit mass.

3. Assertion (A): Components of a homoge neous mixture cannot be separated by using physical methods.
Reason (R): Composition of a homoge- neous mixture is uniform throughout as the compo- nents are mixed uniformly.

Ans. (d) (A) is false but (R) is true.
Explanation: The homogeneous mixture is defined as the mixture that has the same proportions of its components throughout the solution in any given sample. It is obtained by physically mixing of the components and thus can be separated by physical methods.

4. Assertion (A): NaHCO3 has the same empirical and molecular formula.
Reason (R): NaHCO3 evolves CO2 gas on heating.

Ans. (b) Both (A) and (R) are true but (R) is not the correct explanation of (A).
Explanation: Molecular formula
= n x Empirical formula.

The value of n

$$= \frac{\text{Molar mass of } NaHCO_3}{\text{Empirical formula mass } NaHCO_3}$$

$$= \frac{84\ g/mol}{84\ g/mol}$$

$$= 1$$

So, the empirical formula is equal to the molecular formula and this has no relation with the fact that $NaHCO_3$ evolves CO_2 gas on heating.

5. Assertion (A): 8 g of CH_4 and 32 g of SO_2 have the same number of molecules.
Reason (R): Two substances with an equal number of moles have an equal number of molecules.

Ans. (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
Explanation: Number of moles of CH_4

$$= \frac{\text{Mass}}{\text{Molar mass}}$$

$$= \frac{8\ g}{16\ g} = 0.5$$

Number of moles of SO_2

$$= \frac{\text{Mass}}{\text{Molar mass}}$$

$$= \frac{32\ g}{64\ g} = 0.5$$

As both compounds have the same number of moles, so they have the same number of molecules.

6. Assertion (A): Combustion of 16 g of methane gives 18 g of water
Reason (R): In the combustion of methane, water is one of the products.

Ans. (d) (A) is false but (R) is true.

Explanation: $CH_4 + 2O_2 \rightarrow CO_{2(g)} + 2H_2O_{(g)}$

16g 36g

So, the combustion of 16 g *of* CH_4 gives 36g of water.

7. Assertion (A): Molarity and molality of a solution do not depend on temperature.
Reason (R): Molarity and molality depend on the number of moles of solute particles.

Ans. (d) (A) is false but (R) is true.

Explanation: The molarity of a solution depends upon the temperature whereas molality does not. This is due to the reason that the molarity of a solution is related to the volume of solution which in turn is related to temperature, whereas molality is related to the mass of solvent.