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Answers Key:

2 Marks

1. 0.33 mol

2.

Element	%	Atomic mass	Relative number of moles	Simplest molar ratio	Simplest whole number molar Ratio
C	64.4	12	$\frac{64.4}{12} = 5.36$	$\frac{5.36}{0.53} = 10.1$	10
H	5.50	1	$\frac{5.50}{1} = 5.50$	$\frac{5.50}{0.53} = 10.4$	10
Fe	29.9	56	$\frac{29.9}{56} = 0.53$	$\frac{0.53}{0.53} = 1$	1

Therefore, empirical formula = $C_{10}H_{10}Fe$

3. (i) 52 moles of Ar
$\because$ 1 mole of Ar contains 6.022×10^{23} atoms
$\therefore$ 52 Moles of mole of Ar contains $6.022 \times 10^{23} \times 52$
$= 3.13 \times 10^{25}$ atoms.
(ii) 52 u of He
$\because$ 4 u of He = 1 atom
$\therefore$ 52 u of He = $\frac{1}{4} \times 52$ = 13 atoms
(iii) 52 g of He.
4 g of He contains 6.022×10^{23} atoms
52g of He contains $\frac{6.022 \times 10^{23}}{4}$
$= 7.83 \times 10^{24}$ atoms

4. Since molarity (M) is calculated by following formula.
Molarity = weight × 1000/molecular weight × voulme(mL)
[molecular weight of NaCl = 58.5g]
$= \frac{5.85 \times 1000}{58.5 \times 500}$ =0.2 mol L^{-1}

5. In the given question 0.9g L^{-1} means that 1000 mL solution contains 0.9 g of glugose
Number of moles = 0.9g glucose = $\frac{0.9}{180}$mol glugose
$= 5 \times 10^{-3}$mol glugose.
(where molecular mass of glugose($C_2H_{12}O_6$) = $12 \times 6 + 12 \times 1 + 6 \times 16 = 180u$)
i.e IL solution contains 0.05 mole glugose or the molarity of glucose is 0.005M.

6. Molar mass of NH_3 = 14 + 1 x 3 = 17 g mol^{-1}
Percentage of N = $\frac{\text{mass of Nin } NH_3}{\text{molar mass of } NH_3} \times 100$
$= \frac{14}{17} \times 100$
= 82.35 %

7. 1 mole of carbon atoms = 6.023×10^{23} atoms of carbon
Mass of 1 atom of 12C =Atomic mass of C/Avogadro's number
$= \frac{12}{6.022 \times 10^{23}} g$
$= 1.9927 \times 10^{-23}$ g

8. The compound is C_2H_4.
The atomic mass of C is 12 grams and the atomic mass of hydrogen is 1 gram.
Hence the molecular mass of ethene is $2 \times 12 + 1 \times 4 = 28$ grams.
The amount of C is $12 \times 2 = 24$ grams.
Hence mass percentage of carbon in ethene can be given as follows-
$\frac{24}{28} \times 100 = 85.71\%$

9. Mass percent of an element
$= \frac{\text{Mass of that element in the compund} \times 100}{\text{Molar mass of } Na_2SO_4}$
= (2×22.99) + 32.06 + (4×16.00) = 142.04 g
Mass percent of Sodium
$= \frac{45.98 \times 100}{142.04}$
= 32.37
Mass percent of Sulphur
$= \frac{32.06 \times 100}{142.04}$
= 22.57
Mass percent of oxygen
$= \frac{64 \times 100}{142.04}$
= 45.06

10. Molecular mass of glucose ($C_6H_{12}O_6$)
= 6(12.011 u) + 12(1.008 u) + 6(16.00 u)
= (72.066 u) + (12.096 u) + (96.00 u)
= 180.162 u

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