ANSWERS TO UNIT II : INTRODUCTION TO CHEMISTRY

1. (a) unknown amount = cost in dollars or # of dollars
initial amount = 100 g
conversion factor = \$50/g, or 1 g/\$50
$\$ = 100\,g \times \frac{\$50}{1\,g} = \$5000.00$

(b) unknown amount = # of disks
initial amount = \$36.00
conversion factor = \$6.00/10 disks, or 10 disks/\$6.00
$\#\text{disks} = \$36.00 \times \frac{10\text{ disks}}{\$6.00} = 60\text{ disks}$

(c) unknown amount = volume in millilitres or # of millilitres
initial amount = 20 g
conversion factor = 0.35 g/mL, or 1 mL/0.35 g
$\#\text{mL} = 20\,g \times \frac{1\,mL}{0.35\,g} = 60\,mL$

(d) unknown amount = # of kiwi fruit
initial amount = \$5
conversion factor = 3 kiwi fruit/\$1, or \$1/3 kiwi fruit
$\#\text{kiwi} = \$5 \times \frac{3\text{ kiwi}}{\$1} = 15\text{ kiwi}$

(e) unknown amount = # of bims
initial amount = 30 tuds
conversion factor = 4 bims/5 tuds, or 5 tuds/4 bims
$\#\text{bims} = 30\text{ tuds} \times \frac{4\text{ bims}}{5\text{ tuds}} = 24\text{ bims}$

(f) unknown amount = # of goats
initial amount = 10 cows
conversion factor = 2 cows/7 goats, or 7 goats/2 cows
$\#\text{goats} = 10\text{ cows} \times \frac{7\text{ goats}}{2\text{ cows}} = 35\text{ goats}$

(g) unknown amount = mass of oxygen or # of grams
initial amount = 5.5 moles
conversion factor = 32 g/mole, or 1 mole/32 g
$\#g = 5.5\text{ moles} \times \frac{32\,g}{1\,mol} = 180\,g$

(h) unknown amount = # of sulphur molecules
initial amount = 104 sulphur atoms
conversion factor = 8 sulphur atoms/1 sulphur molecule, or 1 sulphur molecule/8 sulphur atoms
$\#\text{m.c} = 104\text{ atoms} \times \frac{1\text{ m.c.}}{8\text{ atoms}} = 13\text{ m.c}$

(i) unknown amount = length of time or # of seconds
initial amount = 200 coulombs
conversion factor = 35 coulombs/s, or 1 s/35 coulombs
$\#\text{sec} = 200\text{ coul} \times \frac{1\,s}{35\text{ coul}} = 6\text{ sec}$

(j) unknown amount = temperature increase or # of °C
initial amount = 100 kJ
conversion factor = 4.18 kJ/1°C, or 1°C/4.18 kJ
$\#°C = 100\,kJ \times \frac{1°C}{4.18\,kJ} = 20°C$

2. (a) $\#\text{ of atoms} = 5.5\text{ mol} \times \frac{6.02 \times 10^{23}\text{ atoms}}{1\text{ mol}} = \mathbf{3.3 \times 10^{24}\text{ atoms}}$

(b) $\#\text{ of moles} = 25.0\text{ L} \times \frac{1\text{ mol}}{22.4\text{ L}} = \mathbf{1.12\text{ mol}}$

(c) $\#\text{ of moles} = 7.0\text{ g} \times \frac{1\text{ mol}}{28\text{ g}} = \mathbf{0.25\text{ mol}}$

(d) $\#\text{ of seconds} = 200.0\text{ coulombs} \times \frac{1\text{ s}}{35\text{ coulombs}} = \mathbf{5.7\text{ s}}$

(e) $\#\text{ of atmospheres} = 4 \times 10^{-8}\text{ kPa} \times \frac{1\text{ atm}}{101.3\text{ kPa}} = \mathbf{4 \times 10^{-10}\text{ atmospheres}}$

(f) $\#\text{ of kilograms} = 3.20 \times 10^{4}\text{ troy ounce} \times \frac{0.0311\text{ kg}}{1\text{ troy ounce}} = \mathbf{995\text{ kg}}$

(g) $\#\text{ of milliseconds} = 5.0 \times 10^{-4}\text{ s} \times \frac{1\text{ ms}}{10^{-3}\text{ s}} = \mathbf{0.50\text{ ms}}$

(h) $\#\text{ of moles} = 15\,100\text{ kJ} \times \frac{1\text{ mol}}{5450\text{ kJ}} = \mathbf{2.77\text{ mol}}$

i) $\#\text{mL} = 0.05\text{ micron} \times \frac{10^{-3}\text{ mm}}{1\text{ micron}} = 5 \times 10^{-5}\text{ mm}$