# Mole Concept
## DPP-2
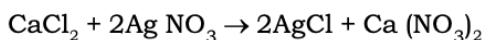


**Ashish Bibyan**
B.Tech (IIT Delhi)
**Referral Code: ABSIRLIVE**

**Some Reactions to be used**

$$2C_8H_{18} + 17\,O_2 \rightarrow 16\,CO + 18\,H_2O$$

$$C_2H_6 + O_2 \rightarrow CO_2 + H_2O \text{ (unbalanced)}$$

$$CaCl_2 + 2Ag\,NO_3 \rightarrow 2AgCl + Ca\,(NO_3)_2$$

$$KClO_3 \rightarrow KCl + 3/2\,O_2$$
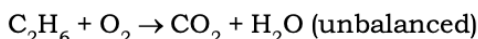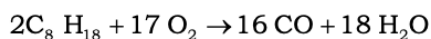
1. Calculate the number of $mol$ of ammonia, $NH_3$, required to produce 2.50 $mol$ of $Cu(NH_3)_4SO_4$ according to the equation: $CuSO_4 + 4NH_3 \rightarrow Cu(NH_3)_4\,SO_4$.

2. For the reaction $Ba(OH)_2 + 2HClO_3 \rightarrow Ba(ClO_3)_2 + 2H_2O$, calculate the number of $mol$ of $H_2O$ formed when 0.100 $mol$ of $Ba(OH)_2$ is treated with 0.250 $mol$ of $HClO_3$.

3. How much carbon monoxide is produced from the reaction of 1.00 kg of octane, $C_8H_{18}$ and 1.00 kg of oxygen?

4. Calculate the number of g of $CO_2$ which can be produced by burning 90.0 g of ethane, $C_2H_6$, in excess oxygen.

5. How many g of $CaCl_2$ does it take to produce 14.3 g of $AgCl$ when treated with excess $AgNO_3$? $Ca(NO_3)_2$ is the other product.

6. How much $KClO_3$ must be heated to obtain 2.50 g of oxygen?

7. What mass of KI is needed to produce 69.6 g of $K_2SO_4$ by the reaction $8KI + 5H_2SO_4 \rightarrow 4K_2SO_4 + 4I_2 + H_2S + 4H_2O$?

8. The reaction $2Al + 3MnO \rightarrow Al_2O_3 + 3\,Mn$ proceeds until the limiting substance is all consumed. A mixture containing 110 g $Al$ and 200 g MnO was heated to initiate the reaction. Which initial substance remained in excess, and by how much?

9. Calculate the amount of carbon dioxide that could be produced when **(NCERT Problem)**

   (i) 1 mole of carbon is burnt in air.

   (ii) 1 mole of carbon is burnt in 16 g of dioxygen.

   (iii) 2 moles of carbon are burnt in 16 g of dioxygen.

10. In a reaction **(NCERT Problem)**

    $$A + B_2 \rightarrow AB_2$$
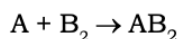
    Identify the limiting reagent, if any in the following reaction mixtures.

    (i) 300 atoms of A + 200 molecules of $B_2$  (ii) 2 mol A + 3 mol $B_2$

    (iii) 100 atoms of A + 100 atoms of B  (iv) 5 mol A + 2.5 mol B

    (v) 2.5 mol A + 5 mol B

11. Dinitrogen and dihydrogen react with each other to produce ammonia according to the following chemical equation : **(NCERT Problem)**

    $$N_2\,(g) + H_2\,(g) \rightarrow 2NH_3\,(g)$$

    (i) Calculate the mass of ammonia produced if $2.00 \times 10^3$ g dinitrogen reacts with $1.00 \times 10^3$ g of dihydrogen.

    (ii) Will any of the two reactants remain unreacted ?

    (iii) If yes, which one and what would be its mass ?

12. Chlorine is prepared in the laboratory by treating manganese dioxide $(MnO_2)$ with aqueous hydrochloric acid according to the reaction **(NCERT Problem)**

    $$4\,HCl\,(aq) + MnO_2(s) \rightarrow 2H_2O\,(l) + MnCl_2(aq) + Cl_2\,(g)$$

    How many grams of HCl react with 5.0 g of manganese dioxide ?

13. One mole of $CO_2$ contains

    (a) $6.02 \times 10^{23}$ atoms of C  (b) $6.02 \times 10^{23}$ atoms of O

    (c) $18.1 \times 10^{23}$ molecules of $CO_2$  (d) 3 g atoms of $CO_2$

**14.** Which has maximum molecules ?
(a) 7 g $N_2$　　　　　(b) 16 g $O_2$　　　　　(c) 2 g $H_2$　　　　　(d) 16 g $NO_2$

**15.** Which of the following contains atoms equal to those in 12 g Mg ? (At. wt. Mg = 24)
(a) 12 gm C　　　　　(b) 7 gm $N_2$　　　　　(c) 32 gm $O_2$　　　　　(d) None of These

**16.** The largest number of molecules is in
(a) 36 g of water　　　(b) 28 g of $CO_2$　　　(c) 46 g of $CH_3OH$　　　(d) 58 g of $N_2O_5$

**17.** If $1\frac{1}{2}$ moles of oxygen combine with Al to form $Al_2O_3$, the weight of Al used in the reaction is (Al = 27)
(a) 27 g　　　　　(b) 54 g　　　　　(c) 40.5 g　　　　　(d) 81 g

**18.** The equation $2Al(s) + \frac{3}{2}O_2 \longrightarrow Al_2O_3(s)$ shows that

(a) 2 g of aluminium react with 3/2g of oxygen to produce 1 g of aluminium oxide
(b) 2 g of aluminium react with 3/2 litres of oxygen to produce 1 g of aluminium oxide
(c) 2 moles of aluminium react with 3/2 moles of oxygen to produce one mole of aluminium oxide
(d) 2 moles of aluminium react with 3/2 moles of oxygen to produce 7/2 moles of aluminium oxide.

**19.** If 0.5 mol of $BaCl_2$ is mixed with 0.2 mol of $Na_3PO_4$, the maximum number of mole of $Ba_3(PO_4)_2$ that can be formed is
(a) 0.7　　　　　(b) 0.5　　　　　(c) 0.30　　　　　(d) 0.10

**20.** Which has the highest mass ?
(a) 50 g of iron　　　　　　　　(b) 5 moles of $N_2$
(c) 0.1 mol atom of Ag　　　　　(d) $10^{23}$ atoms of carbon

**21.** How much quick lime can be obtained from 25 gm of $CaCO_3$ ?
(a) 28 g　　　　　(b) 14 g　　　　　(c) 56 g　　　　　(d) none

# ANSWERS

**1.** 10 mol $NH_3$.　　**2.** 0.2　　**3.** 823.53g　　**4.** 264g　　**5.** 5.55g　　**6.** 6.38g

**7.** 132.8g　　　**8.** 59.2g　　　**9.** **(i)** 44g, **(ii)** 22g, **(iii)** 22g

**10.(i)** $B_2$ **(ii)** A **(iii)** $B_2$ **(iv)** $B_2$ (v) A　**11. (i)** 2428.57g **(ii)** Yes, $H_2$ **(iii)** 571.43g

**12.** 8.4g　　　**13.** (a)　　　**14.** (c)　　　**15.** (b)　　　**16.** (a)　　　**17.** (b)
**18.** (c)　　　**19.** (d)　　　**20.** (b)　　　**21.** (b)