

## Numericals on Phase rule

**Q.1 An alloy of Cd & Bi contains 25% Cd. Find the mass of eutectic in 1 kg of alloy if eutectic system contains 40% Cd.**

**Solution:**

1 Kg of alloy contains 25% Cd= 250 gm of Cd

1 Kg of alloy contains 750 gms of Bi

Eutectic contains 40% Cd

Eutectic contains 60% Bi

% of Cd/ % of Bi = Mass of Cd/ Mass of Bi

$40/60 = 250 \text{ gm} / \text{mass of Bi}$

Mass of Bi =  $250 * 60 / 40 = 375 \text{ gm}$

Mass of eutectic = Mass of Cd+ Mass of Bi

$$= 250 + 375 = \underline{625 \text{ gm}}$$

**Q.2 An alloy of Sn & Pb contains 80% tin. Find the mass of eutectic in 1 kg alloy if eutectic contains 60% tin.**

**Solution:**

1 Kg of alloy contains 80% tin= 800 gms

1 Kg of alloy contains 20% Pb= 200 gm

Eutectic contains 60% tin

Eutectic contains 40% lead

% tin/% lead= Mass of tin/Mass of lead

$60/40 = \text{Mass of tin}/\text{Mass of Pb}$

$\text{Mass of tin} = 200 * 60/40$

$$= 300 \text{ gm}$$

**Mass of eutectic** = Mass of tin + mass of Pb

$$= 300 + 200$$

$$= \underline{500 \text{ gm}}$$

**Q.3 An alloy AB of 20 gm contains 20%A. The molten AB on cooling gave out B & eutectic alloy with A & B of equal percentage. What is the amount of B that has formed.**

**Solution:**

20 gm of AB alloy contains = 20% A =  $20 * 20/100 = 4 \text{ gm A}$

20 gm of AB alloy contains = 80% of B = 16 gm of B

Eutectic contains 50% of A & 50% of B

% of A / % of B = Mass of A / Mass of B

$50/50 = 4 / \text{mass of B}$

Mass of B = 4 gm

**Mass of Eutectic** = (Mass of A + Mass of B) in eutectic

$$= 4 + 4 = \underline{8 \text{ gms}}$$

Molten AB on cooling gave out B & eutectic alloy

Mass of Molten AB = Mass of B + Mass of eutectic

$20 = \text{Mass of B} + 8$

**Mass of B** =  $20 - 8 = \underline{12 \text{ gm}}$

Answer : Mass of eutectic = 8 gms

Mass of B formed = 12 gm

**Q.4 An alloy AB of 10 gm weight contains 25% A. The molten AB on cooling gave out B & eutectic alloy with A & B of equal percentage. What is the amount of B that has formed. Also calculate the mass of eutectic formed.**

**Solution:**

10 gm of Alloy AB contains 25% A=  $10 * 25 / 100 = 2.5$  gm of A

10 gm of alloy AB contains 75% B = 7.5 gm of B

Eutectic contains 50 % of A & 50% of B

% A/%B = Mass of A/ Mass of B

$50/50 = 2.5 / \text{Mass of B}$

Mass of B = 2.5 gm in eutectic

**Mass of Eutectic** =( Mass of A+Mass of B) in eutectic  
 $= 2.5 + 2.5 = \underline{5 \text{ gm}}$

Molten AB → Eutectic + B

Mass of molten AB= Mass of eutectic + Mass of B

$10 = 5 + \text{Mass of B}$

**Mass of B**=  $10 - 5 = \underline{5 \text{ gm}}$

**Q.5 1000 kg sample of argentiferous lead containing 0.1% Ag is melted & then allowed to cool. If eutectic contains 2.6% Ag what mass of**

- i) Mass of eutectic will be formed.
- ii) Mass of Pb will be separated out.

**Solution:**

Mass of Pb separated = 961.54 Kg

Mass of eutectic formed = 38 .46 kg

**Q.6 An alloy of Cd & Bi contains 20% Cd. Find the mass of eutectic in 2kg of alloy if eutectic contains 50% Cd.**

**Solution:**

2 Kg alloy contains 20% Cd = 400 gm of Cd

2 Kg of alloy contains 1600 gm of Bi

Eutectic contains 50% Cd & 50 % Bi

% of Cd/ % of Bi= Mass of Cd/ Mass of Bi

$50/50 = 400 / \text{mass of Bi}$

Mass of Bi = 400 gm

**Mass of Eutectic** = Mass of Cd + mass of Bi

$$= 400 + 400$$

$$= \underline{\underline{800 \text{ gm}}}$$