2014-XE-14-26

EE24BTECH11001 - ADITYA TRIPATHY

1) Polymerized isotactic polybutadiene has a molecular weight of $3 \times 10^5 g/mol$. The degree of polymerization is (2014 – XE)

2) A bar of Ti with Young's modulus of 110 GPa and yield strength of $880MPa$ is tested in tension. It is noticed that the alloy does not exhibit any strain hardening and fails at a total strain of 0.108. The mechanical energy that is necessary to break the material in MJ/m^3 is (2014 – XE)

3) A copper cup weighing 140 g contains 80 g of water at 4 $^\circ C$. Specific heats of water and copper are 4.18 and 0.385 J/g $^\circ C$, respectively. If 100 g of water that is at 90 $^\circ C$ is added to the cup, the final temperature of water in $^\circ C$ is (2014 – XE)

4) Match the reaction in **Column I** with its name in **Column II**.
L - liquid $\alpha, \beta, \gamma-$ different solid solution phases

Column I	**Column II**
P. $L \xrightarrow{cooling} \alpha + \beta$	1. peritectic
Q. $L + \beta \xrightarrow{cooling} \gamma$	2. eutectic
R. $\alpha \xrightarrow{cooling} \beta + \gamma$	3. monotectic
	1. eutectoid

(2014 – XE)

a) P-1, Q-4, R-3

b) P-2, Q-1, R-4

c) P-2, Q-3, R-1

d) P-4, Q-2, R-3

5) The Young's modulus of a unidirectional SiC fiber reinforced Ti matrix is 185 GPa. If the Young's modulii of Ti and SiC are 110 and 360 GPa respectively, the volume fraction of fibers in the composite is

(2014 – XE)

6) Match the composite in **Column I** with the most suitable application in **Column II**

Column I	**Column II**
P. Glass fibre reinforced plastic	1. Missile cone heads
Q. SiC particle reiforced Al alloy	2. Commercial automobile chasis
R. Carbon-carbon composite	3. Airplane wheel tyres

S. Metal fibre reinforced rubber

4. Car piston rings

5. High performance skate boards

(2014 – *XE*)

a) P-4, Q-5, R-1, S-2

b) P-3, Q-5, R-2, S-4

c) P-5, Q-4, R-1, S-3

d) P-4, Q-2, R-3, S-1

7) Which among the following rules need to be satisfied for obtaining an isomorphous phase diagram in a binary alloy system?

P. The atomic size difference should be less than 15%
Q. Both the end components should have the same crystal structure
R. The valency of the end components should be the same
S. The end components should have dissimilar electronegativities

(2014 – *XE*)

a) P, Q, R

b) Q, R, S

c) R, S, P

d) S, P, Q

8) The energy in eV and the wavelength in μm, respectively, of the photon emitted when an electron in a hydrogen atom falls from $n = 4$ to $n = 2$ state is (2014 – *XE*)

a) 3.0, 0.413

b) 2.55, 0.365

c) 2.75, 0.451

d) 2.55, 0.487

9) The weight in kg of gallium (Ga) to be mixed with arsenic (As) for obtaining 1.0 kg of gallium arsenide ($GaAs$) is (2014 – *XE*)

10) Match the material in **Column I** with the property in **Column II**

Column I	**Column II**
P. $Pb(Zr, Ti)O_3$	1. Shape memory alloy
Q. $Ni_{50}Ti_{50}$	2. Piezoelectric ceramic
R. $GaAs$	3. High temperature superconductor
S. $YBa_2Cu_3O_7$	4. Optoelectronic semiconductor

(2014 – *XE*)

a) P-4, Q-5, R-1, S-2

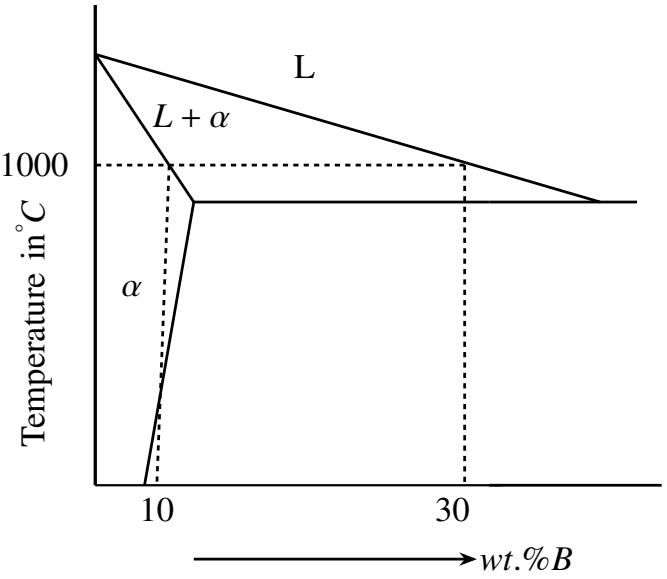
b) P-3, Q-5, R-2, S-4

c) P-5, Q-4, R-1, S-3

d) P-4, Q-2, R-3, S-1

(2014 – *XE*)

11) Relevant portion of a binary phase diagram of elements A and B is shown below. The mass fraction of liquid phase at $1000^{\circ}C$ for an alloy with 15 wt.%B is (2014 – *XE*)



12) The expected diffraction angle (in degrees)for the first order reflection from the (113) set of planes for face centered cubic Pt (lattice parameter = 0.392 nm) using monochromatic radiation of wavelength 0.1542 nm is (2014 – XE)

13) The diffusion coefficients of iMg in Al at 500 and 550$^{\circ}C$ are 1.9×10^{-13} and $5.8 \times 10^{-13} m^2/s$ respectively. The activation energy for diffusion of Mg in Al in kJ/mol is (2014 – XE)