KCET Physics Sample Question

Question 1: A substance of mass 49.53 g occupies 1.5 cm3 of volume. The density of the substance (in g cm3) with the correct number of significant figures is

     a. 3.302

     b. 3.300

     c. 3.3

     d. 3.30

Solution:

     Answer: (G)

Question 2: A car moving with a velocity of 20 ms–1 is stopped at a distance of 40 m. If the same car is travelling at double the velocity, the distance travelled by it for the same retardation is

     a. 640 m

     b. 320 m

     c. 1280 m

     d. 160 m

Solution:

     Answer: (d)

     Let the initial speed of the car be u = 20 m / s

     Final speed of car; V = 0 m / s

     Retardation = a

     Case – I

     V2 = u2 + 2as

     0 = u2 + 2as

     – 400 / [2 * 40] = a

     [a = –5 m / s2]

     Case – II

     u = 40 m / s

     v = 0 m / s

     a = –5 m / s2

     s = ?

     V2 = u2 +2as

     0 = (40)2 + 2 (–5). S

     S = 1600 / 10

     S = 160 m

Question 3: The angle between velocity and acceleration of a particle describing uniform circular motion is

     a. 45º

     b. 60º

c. 90º
d. 180º

Solution:

Answer: (c)

In a circular motion, velocity is always tangential to the circular path. Also in a uniform circular motion, tangential acceleration is zero. Hence, the net acceleration will be centripetal acceleration which always acts towards the centre of the circular path. Hence, velocity and acceleration of a particle describing uniform circular motion are at a right angle to each other.

Question 4: If
$\vec{A} = 2\hat{i} + 3\hat{j} + 8\hat{k}$
is perpendicular to
$\vec{B} = 4\hat{j} - 4\hat{i} + \alpha\hat{k}$
then the value of 'α' is

    a. 1 / 2
    b. -1 / 2
    c. 1
    d. −1

Solution:

Answer: (b)

When vectors are perpendicular to each other, then their dot product is zero.
$\vec{A}.\vec{B}$
$= 0$
$(2\hat{i} + 3\hat{j} + 8\hat{k}).(4\hat{j} - 4\hat{i} + \alpha\hat{k})$
$= 0$
$-8 + 12 + 8\alpha = 0$
$8\alpha = -4$
$\alpha = -1 / 2$

Question 5: A body of mass 50 kg, is suspended using a spring balance inside a lift at rest. If the lift starts falling freely, the reading of the spring balance is

    a. = 50 kg
    b. > 50 kg
    c. < 50 kg
    d. = 0

Solution:

Answer: (d)

As the lift is falling freely, therefore its acceleration = g (downwards)
Let, the force acting on body due to spring is "F"
$\therefore$ (50g) – F = (50) a
50g – F = 50 g
F = 0

Thus, no force is acting on the body due to spring.
So, the reading of spring balance is zero.

KCET Chemistry Sample Question

Question 1: If 3.01×10^{20} molecules are removed from 98 mg of H_2SO_4, then the number of moles of H_2SO_4 left are

     a. 0.1×10^{-3} mol
     b. 0.5×10^{-3} mol
     c. 1.66×10^{-3} mol
     d. 9.95×10^{-2} mol

Solution:

     Answer: (b)
     Number of moles of H_2SO_4 left = N / Na
     Now, finding N
     For 98 gm of H_2SO_4 the molecules are 6.02×10^{20}
     H_2SO_4 left = $6.02 \times 10^{20} - 3.01 \times 10^{20} = 3.01 \times 10^{20}$
     Number of moles of H_2SO_4 left = N / NA
     = $3.01 \times 10^{20} / 6.02 \times 10^{23}$
     = 0.5×10^{-3} mol

Question 2: The correct set of quantum numbers for the unpaired electrons of the chlorine atom is

     a. 2, 0, 0, + 1 / 2
     b. 2, 1, − 1 , + 1 / 2
     c. 3, 1, 1, ± 1 / 2
     d. 3, 0, 0, ± 1 / 2

Solution:

     Answer: (c)
     To find out the unpaired electron of the chlorine atom we have to find the electronic configuration Cl = $1S^2\ 2S^2\ 2P^6\ 3S^2\ 3P^5$
     n = 3, l = 1, m = 1, s = ± 1 / 2

Question 3: The electronegativities of C, N Si and P are in the order of

     a. P < Si < C < N
     b. Si < P < N < C
     c. Si < P < C < N
     d. P < Si < N < C

Solution:

     Answer: (c)
     As we move down the group, the electronegativity increases Si < P < C < N.

Question 4: Which of the following structures of a molecule is expected to have three bond pairs and one lone pair of electrons?

a. Tetrahedral
b. Trigonal Planar
c. Pyramidal
d. Octahedral

Solution:

Answer: (c)

It is given that there is a total of three bond pairs and one lone pair.

∴ The total electron pair is 4 which shows sp3 hybridization.

∵ It is given that one lone pair is also present then geometry will be pyramidal.

Question 5: A reaction has both ΔH and ΔS –ve. The rate of reaction
a. increases with an increase in temperature
b. increases with a decrease in temperature
c. remain unaffected by the change in temperature
d. cannot be predicted for change in temperature

Solution:

Answer: (b)

We know, $\Delta G = \Delta H - T\Delta S$

Given that ΔH and ΔS are negative.

Therefore the expression will be

$\Delta G = -\Delta H + T\Delta S$

$-\Delta G = \Delta H - T\Delta S$

By seeing the above equation for negative ΔG the value of ΔS must be less than ΔH.

$\Delta H > T\Delta S$

So, the reaction will be exothermic. If the reaction is exothermic then, its rate will increase with a decrease in temperature.

KCET Maths Sample Question

Question 1: If A and B are finite sets and $A \subset B$, then

a. $n\,(A \cup B) = n\,(A)$
b. $n\,(A \cap B) = n\,(B)$
c. $n\,(A \cup B) = n\,(B)$
d. $n\,(A \cap B) = \phi$

Answer: (c)

Consider the function $A \subset B$

$A \cap B = A$

$N\,(A \cap B) = n\,(A)$

Also,

$n\,(A \cup B) = n\,(A) + n\,(B) - n\,(A \cap B)$

$= n\,(A) + n\,(B) - n\,(A)$

$= n\,(B)$

Question 2: The value of cos2 45o – sin2 15o is –

a. $\sqrt{3}$ / 2
b. $\sqrt{3}$ / 4
c. [$\sqrt{3}$ + 1] / 2 $\sqrt{2}$
d. [$\sqrt{3}$ – 1] / 2 $\sqrt{2}$

Answer: (b)
cos2 45o – sin2 15o
cos (45o + 15o) cos (45o – 15o) {∵ cos2A – sin2 B = cos (A + B) cos (A – B)}
= cos 60o cos 30o
= (1 / 2) ($\sqrt{3}$ / 2)
= $\sqrt{3}$ / 4

Question 3: 3 + 5 + 7 + ……. to n term is –

a. n (n + 2)
b. n (n – 2)
c. n2
d. (n + 1)2

Answer: (a)
3 + 5 + 7 +……………………………+ n
(a = 3, d = 2)
Sn = (n / 2) [2a + (n – 1)d]
= (n / 2) [2 * 3 + (n – 1) 2]
= (n / 2) (6 + 2n – 2)
= (n / 2) (4 + 2n)
= n (n + 2)

Question 4: If ([1 + i] / [1 – i])m = 1, then the least positive integral value of m is –

a. 2
b. 3
c. 4
d. 1
Answer: (c)
Consider the equation
([1 + i] / [1 – i])m = 1
([1 + i] / [1 – i]) * ([1 + i] / [1 + i])m = 1
[(1 + i)2 / (1 – i2)]m = 1
[(1 + 2i – 1) / (1 + 1)]m = 1
(2i / 2)m = 1

(i)m = 1
(i)m = 14
m = 4

Question 5: If |x − 2| ≤ 1, then −
a. x ∈ [1, 3]
b. x ∈ (1, 3)
c. x ∈ [- 1, 3)
d. x ∈ (- 1, 3)

Answer: (a)
|x − 2| ≤ 1
−1 ≤ x − 2 ≤ 1
-1 + 2 ≤ x ≤ 1 + 2
-1 ≤ x ≤ 3
Thus, x ∈ [1, 3]

Question 6: If nC12 = nC8 then n is equal to −

a. 26
b. 12
c. 6
d. 20
Answer: (d)
It is known that if,
nCx = nCy
Then x + y = n
Now nC12 = nC8
So 12 + 8 = n
n = 20