

Chemistry

Question 1

In terms of the "Collision Theory of Chemical Kinetics", the rate of a chemical reaction is proportional to:-

1. The number of product molecules
2. The number of collisions per second
3. The change in free energy per second
4. The change in temperature per second

Question 2

If a system loses 250 kJ of heat at the same time that it is doing 500 kJ of work, what is the change in the internal energy of the system?

1. +750 kJ
2. +250 kJ
3. -750 kJ
4. -250 kJ

Question 3

The compressibility factor for an ideal gas is:-

1. 2.0
2. 1.5
3. 1.0
4. Infinity

Question 4

Which statement is incorrect about zeolites?

1. No zeolites occur naturally
2. A zeolite functions as an acid catalyst, e.g. in the alkylation of aromatic compounds
3. Each zeolite contains channels of a specific size
4. Zeolites are aluminosilicates

Question 5

If a polymer sample has polydispersity index > 1 , it indicates that:-

1. The polymer chains are uniform in length
2. The number average molecular weight is equal to the weight average molecular weight of the polymer
3. The polymer chain lengths vary over a wide range of molecular masses
4. The polymer under consideration is a natural polymer

Mathematics

Question 1:

The number of elements in the power set $P(S)$ of the set $S = \{2, \{1, 4\}\}$ is:-

1. 8
2. 4

3. 2
4. None of these

Question 2:

If $A = \{1,2,3,4\}$ and $R = \{(1,3),(3,4),(1,4)\}$, then R is:-

1. Symmetric
2. Transitive
3. Reflexive
4. None of these

Question 3:

If $|z| = |z - 1|$, then:-

1. $\operatorname{Re}(z) = 1$
2. $\operatorname{Im}(z) = 1$
3. $\operatorname{Re}(z) = 1/2$
4. $\operatorname{Im}(z) = 1/2$

Question 4:

If the system of equations $x+2y-3z=1$, $(p+2)z=3$, $(2p+1)y+z=2$ is inconsistent, then what is the value of p?

1. $-1/2$
2. 2
3. -2
4. 0

Question 5:

If $f(x) = |x + 2|$, then:-

1. $f(|x|) = |f(x)|$
2. $f(x+y) = f(x) + f(y)$
3. $f(x.y) = f(x).f(y)$
4. None of these