JEE CHEMISTRY

Topic: Radio Activity

Q.1 Radioactivity is a -

(1) nuclear process (2) atomic process

(3) chemical process (4) physical process

Q.2 The value of decay constant of last element of radioactive series is -

(1) infinite (2) much less

(3) zero (4) equal to the decay constant of first element

Q.3 If the pressure on a radioactive material is increased three times, then the mean life of the element -

(1) does not change (2) will become three times

(3) will becomes $\frac{1}{3}$rd (4) will depend on the initial pressure

Q.4 A radioactive material emits 20 β-particles per sec at 10ºC. If the temperature is increased to 20ºC then the emission rate of β-particles per sec is -

(1) 20 (2) 40

(3) 30 (4) 1

Q.5 What will be the effect of dissolving a radioactive material in HNO_3?

(1) Its radioactive properties will remain unchanged

(2) Its radioactive properties will change

(3) The state of material cannot be predicted

(4) None of these

Q.6 The particles emitted by a radioactive substance are deflected in a magnetic field. The particle may be-

(1) neutrons

(2) electrons

(3) protons

(4) hydrogen atoms

Q.7 What will happen when a radioactive substance with mean life 2×10^5 years is dissolved in H_2SO_2 ?

(1) it will dissociate into H^+ and SO_2 ions

(2) it will be converted into SO_2 gas

(3) it will be converted into H_2 gas

(4) it will remain unchanged

Q.8 The half life of a radioactive material is 20 days. If it is heated to 10000 K, then its half life will become-

(1) 20 × 10000 days (2) 20/10000 days

(3) 9800 days (4) 20 days

Q.9 The following is not an application of radioactive material -

(1) to locate cracks in welding or castings

(2) to find the thickness of material

(3) in cigarette factory

(4) in photography

Q.10 SI unit of radioactivity is -

(1) curie (2) rutherfored

(3) rontgen (4) bacqueral

Q.11 The graph between remaining radioactive atoms and time for a radioactive decay is -

(1) straight line (2) parabola

(3) exponential (4) ellipse

Q.12 Number of active atoms in m gram material is :

(M $\rightarrow$ atomic weight)

(1) Mm × 6.02 × 10^{23}

(2) (M/m) × 6.02 × 10^{23}

(3) 6.02 × 10^{23}/Mm

(4) (m/M) × 6.02 × 10^{23}

Q.13 The activity of a radioactive element (decay constant λ) becomes $\frac{1}{3}$ of initial activity A_0 in 9 years then the decay constant after 9 years will -

(1) λ (2) $\lambda/3$

(3) $\lambda/9$ (4) $2\lambda/3$

Q.14 A radioactive sample contains two elements P and Q. The mass of each is 10^{-3}kg. The ratio of their atomic weights is 1 : 3. Their half lives are 4s and 8s respectively. The mass of P and Q after 16s will respectively be -

(1) 1.25 × 10^{-5} kg and 2.5 × 10^{-4} kg

(2) 6.25 × 10^{-5} kg and 2.5 × 10^{-4} kg

(3) 6.25 × 10^{-5} kg and 1.25 × 10^{-4} kg

(4) 2.25 × 10^{-5} kg and 6.25 × 10^{-4} kg

Q.15 A fraction of $\frac{5}{9}$ of a radioactive substance decays in time t. What fraction of the substance would had been active after time $\frac{t}{2}$ -

(1) 1/2 (2) 2/3

(3) 3/4 (4) 4/5

Q.16 What percentage of the atoms in a sample will remain undecayed in a time equal to mean life ?

(1) 100% (2) 63%

(3) 50 % (4) 37%

Q.17 If the quantity of radioactive material reduces by 10% in 5 days, then the quantity that remains after 20 days will be -

(1) 70% (2) 75 %

(3) 65 % (4) 60%

Q.18 The half life of a radioactive substance is 23.10 minute. If 10^{23} atoms of the substance are active at any instant of time, then the activity of the substance will be - (in dps)

(1) 1×10^{19} (2) 3×10^{19}

(3) 5×10^{19} (4) 7×10^{19}

Q.19 We get N_1 and N_2 β-particles per second from two specimens of a radioactive specimen, then the ratio of number of atoms present in the samples is -

(1) N_2/N_1 (2) N_1/N_2

(3) N_1^2/N_2^2 (4) None of these

Q.20 A radio active substance has $t_{1/2}$ = 60 min. After 3 hrs, what percentage of radioactivity will remain -

(1) 50% (2) 17.5%

(3) 12.5% (4) 25%

Q.21 When 64 gms of a radioactive element are carried from Jaipur to Jodhpur in 2 hours, then 1 gm of active element remains. The half life of the element is -

(1) 2 hours (2) 30 minute

(3) 20 minute (4) 1 hour

Q.22 The number of active atoms of a radio active element decreases from 1024 to 128 in 6 hours. The half life of the element is -

(1) 6 hours (2) 4 hours

(3) 3 hours (4) 2 hours

Q.23 The weight based ratio of U^{238} and Pb^{226} in a sample of rock is 4 : 3. If the half life of U^{238} is 4.5×10^9 years, then the age of rock is -

(1) 9.0×10^9 years (2) 6.3×10^9 years

(3) 4.5×10^9 years (4) 3.78×10^9 years

Q.24 The rate of decay of radioactive element at a given instant of time is 10^3 disintegration per second. If the half life of this element is 1 second, then the rate of decay after 3 second will be -

(1) 12 per sec (2) 50 per sec

(3) 500 per sec (4) 125 per sec

Q.25 A radioactive isotope X with a half-life of 1.37×10^9 years decays to Y which is stable. A sample of rock from the moon was found to contain both the elements X and Y which were in the ratio 1 : 7. The age of the rocks is -

(1) 1.96×10^8 years (2) 3.85×10^9 years

(3) 4.11×10^9 years (4) 9.59×10^9 years

Q.26 Two radioactive substance X and Y initially contain equal number of nuclei. X has a half life of 1 hours and Y has half of 2 hours. After two hours t he ratio of the activity of X to the activity of Y is -

(1) 1 : 4 (2) 1 : 2

(3) 1 : 1 (4) 2 : 1

Q.27 The radioactivity of a sample is R_1 at a time T_1 and R_2 at a time T_2 If the half-life of the specimen is T, the number of atoms that have disintegrated in the time $(T_2 - T_1)$ is proportional to -

(1) $(R_1 T_1 - R_2 T_2)$ (2) $(R_1 - R_2)$

(3) $(R_1 - R_2)\ T$ (4) $(R_2 - R_1) / T$

Q.28 The counting rate observed from radioactivity source at t = 0 second was 1600 counts per second and at t = 8 seconds it was 100 counts per second. The counting rate observed, as counts per second at t = 6 seconds will be -

(1) 400 (2) 300

(3) 200 (4) 150

Q.29 A radioactive sample at any instant has its disintegration rate 5000 disintegrations per minute. After 5 minutes, the rate is 1250 disintegrations per minute. Then, the decay constant (per minute) is -

(1) 0.8 ln 2 (2) 0.4 ln 2

(3) 0.2 ln 2 (4) 0.1 ln 2

Q.30 The fraction of a radioactive material which remains active after time t is 9/16. The fraction which remains active after time t/2 will be -

(1) 4/5 (2) 7/8

(3) 3/5 (4) 3/4

ANSWER KEY

Que.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Ans.	1	3	1	1	1	2	4	4	4	4
Que.	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Ans.	3	4	1	2	2	4	3	3	2	3
Que.	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
Ans.	3	4	4	4	3	3	3	3	2	4