Sri Chaitanya IIT Academy, India

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A right Choice for the Real Aspirant

ICON CENTRAL OFFICE, MADHAPUR-HYD

Sec: Sr. IPLCO	JEE ADVANCED	DATE : 27-12-15
TIME : 3:00	2014_P2 MODEL	MAX MARKS : 180

KEY & SOLUTIONS

PHYSICS

1	**A**	2	**C**	3	**A**	4	**B**	5	**B**	6	**D**
7	**C**	8	**D**	9	**A**	10	**D**	11	**C**	12	**C**
13	**C**	14	**B**	15	**C**	16	**A**	17	**C**	18	**A**
19	**C**	20	**A**								

CHEMISTRY

21	**D**	22	**D**	23	**C**	24	**B**	25	**A**	26	**A**
27	**B**	28	**C**	29	**C**	30	**A**	31	**B**	32	**A**
33	**B**	34	**A**	35	**B**	36	**C**	37	**D**	38	**A**
39	**D**	40	**A**								

MATHEMATICS

41	**A**	42	**C**	43	**A**	44	**A**	45	**A**	46	**C**
47	**A**	48	**A**	49	**A**	50	**A**	51	**B**	52	**B**
53	**D**	54	**B**	55	**B**	56	**C**	57	**B**	58	**C**
59	**D**	60	**A**								

PHYSICS

2. Sol 1.5 hr = 3 $T_{Halflife}$

at beginning of 1.5 hr count rate = $(2)^3 \text{x} 5 = 40\sec^{-1}$

$40\sec^{-1} = \frac{1}{9}\text{x}360\text{s}^{-1} = \frac{1}{9}\text{xinitial rate}$

intensity of radiation = $\frac{1}{9}$ x initial intensity at 2m

but intensity $\propto \frac{1}{d^2}$

so, new distance = 3 x initial distance = 3 x 2 = 6m

3. sol $hf_1 = w + \frac{1}{2}mv_1^2$

$hf_2 = w + \frac{1}{2}mv_2^2$

$\frac{2h}{m}(f_1 - f_2) = v_1^2 - v_2^2$

4. sol The energy of k-shell is $E = \frac{-1240}{0.015} = -82.6keV$

$\therefore$ Energy between k and L shall is

$E_{2-1} = \frac{3}{4}(82.6) = 62keV$

7. sol the nuclei with greatest BE per nucleon is most stable.

11. sol $r = \frac{q_1 q_2}{4\pi\varepsilon_0 (2KE)}$

$v^2 = \frac{q_1 q_2}{4\pi\varepsilon_0 mr}$ $v^2 = \frac{1.6\times10^{-19}\times1.6\times10^{-19}\times9\times10^9}{10^{-15}\times2\times1.67\times10^{-27}}$

$v = 8.3\times10^6 ms^{-1}$

12. Sol $R = \frac{mv}{eB}$ or $B = \frac{2\times1.67\times10^{-27}\times8.3\times10^6}{1.6\times10^{-19}\times1.25} = 139mT$

13 & 14

$\text{R} = \frac{\text{mv}\sin\theta}{\text{qB}} \Rightarrow \text{v}\sin\theta = 1.2\times10^7 \text{ m/s}$ (Change of α-particle = 3.2×10^{-19} c]

$$P = \frac{2\pi m}{qB} v\cos\theta \Rightarrow v\cos\theta = \frac{PqB}{2\pi m} = 9\times10^{6}\ m/s$$

$$\therefore \quad V_\alpha = \sqrt{\left(v\sin\theta\right)^2 + \left(v\cos\theta\right)^2} = 1.5\times10^{7}\ m/s$$

$$m_y v_y = m_\alpha v_\alpha \Rightarrow v_y = 2.715\times10^{5}\ m/s$$

$\therefore$ TE released during an α-decay of the nucleus X is,

$$E = KE_y + KE_\alpha = \frac{1}{2}m_y v_y^2 + \frac{1}{2}m_\alpha v_\alpha^2 = 4.77\,MeV$$

15 & 16

sol $$E_{n_2\to n_1} = -\left(13.6eV\right)Z^2\left[\frac{1}{{n_2}^2} - \frac{1}{{n_1}^2}\right]$$

So, $204 = -13.6Z^2\left(\frac{1}{4n^2} - 1\right)$

and $40.8 = -13.6Z^2\left(\frac{1}{4n^2} - \frac{1}{n^2}\right)$

taking the ratio , $n = 2$, Putting in above equation Z= 4

$$E_{\min} = -13.6eV\times4^2\left(\frac{1}{4^2} - \frac{1}{3^2}\right) = 10.58eV$$