Q.3 Attempt ***any four*** of the following **15**

(A) Explain the construction and working of Geiger Muller counter with the help of appropriate diagram. **05**

(B) Give an example of artificial radioactivity. Distinguish between artificial and natural radioactivity (any three points). **05**

(C) Describe the basic components of a nuclear reactor. **05**

(D) Give two applications of radioisotopes being used as tracers to study reaction mechanism. **05**

(E) The Q-value of the nuclear reaction: $^{24}Mg + {}^{2}H \longrightarrow Na + {}^{4}He$. is 2.1413 MeV. Calculate the isotopic mass of Na, the mass of: **05**
^{24}Mg = 23.9427 a m u, ^{2}H = 2.0147 a m u, ^{4}He = 4.00381 a m u.

(F) Define decay constant. A radio element has half-life of 140 days. How much time in seconds will be required so that activity falls to 0.05th of its original value. **05**

Q.4 Attempt ***any four*** of the following

(A) State BET equation, identify the terms involved in it,test the validity of the equation. **05**

(B) Give the assumptions on which Langmuir adsorption isotherm is based. **05**

(C) Describe any two methods by which colloids acquire electric charge. **05**

(D) Derive an expression to show that at equilibrium, the distribution of diffusible salt is influenced by the presence of non-diffusible salt across semipermeable membrane. **05**

(E) Describe an experiment to study electrophoresis. **05**

(F) Explain the use of surfactants in pesticide and food industry. **05**

Q.5 Answer the following questions

(A) Match the following the following.**(** ***any five)*** **05**

a. Rotational energy level.	i. Hertz
b. Raman spectra.	ii. HCl molecule
c. Microwave active.	iii. linear molecule
d. 3n-5	iv. unequally spaced
e. Number of vibrational mode for CH_4 molecule.	v. IR radiations
f. Moment of inertia.	vi. scattering of light
g. Changes in rotational and vibrational energy.	vii. kg m^2
h. Frequency	viii. non linear molecule
	ix. H_2 molecule
	x. 9
	xi.10

(B) *State **True** or **False** for the following.***(<u>*any five)*</u>** **05**

a. Berkley Hartley method is used to determine depression in freezing point .
b. The salt of Na_2SO_4 in aqueous solution dissociates to give two ions
c. Liquids with weak intermolecular forces are less volatile.
d. Osmotic pressure is related to the activity of the solvent.
e. Beckmann thermometer is a differential thermometer.
f. For slow reaction P< 1.
g. Collision theory considers reacting molecules as rigid spheres.
h. According to Collision theory, the colliding molecules possess translational and rotational motion.

(C) *Fill in the blanks from the given words.***(<u>*any five)*</u>** **05**

(K>1, ^{239}Pu, endoergic , fission , ^{235}U, exoergic, fusion, (n,p), anthracene, (p, n), K = 0.)
a. ——— is used as phosphor in Scintillation counter.
b. Threshold energy is calculated for —————— nuclear reactions.
c. ————— is fissile material.
d. Fission reaction is sustained if ——————.
e.—————— reactions are known as thermonuclear reactions.
f. ^{27} Al + ^{1}n —-> ^{27} Mg + ^{1}H is —————- type of transmutation.
g. ^{238}U can be converted into —————-

(D) *Define :(<u>any five</u>).* **05**

a. Adsorption isotherm
b. Critical Micelle concentration
c. Sol
d. Gel
e. Dispersed phase
f. Colloidal electrolyte
g. isoelectric point.

****