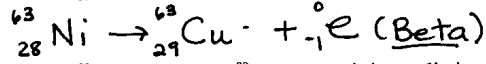


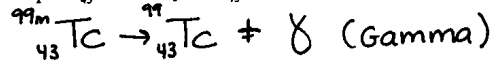
Chemistry 101 Chapter 10

- In the general symbol ${}^A_Z X$ for a nucleus, which of the three letters represents the atomic number? $Z = \text{atomic Number}$ ($A = \text{Atomic Mass}$) ($X = \text{symbol}$)
- What is the mass number of an alpha particle? all have 4!
 (4) ${}^4_2\text{He}$
- What is the mass number of a beta particle? ${}^0_{-1}e$ ← (all zero) positron ${}^0_{+1}e$ too!
- Write the complete symbol for a beta particle, in the form ${}^A_Z X$. ${}^0_{-1}e$
- Which type of radiation emitted by radioactive nuclei is similar in mass to a helium atom? alpha particle ${}^4_2\text{He}$
- Which type of radiation emitted by radioactive nuclei is negatively charged? Beta ${}^0_{-1}e$
- Which type of radiation emitted by radioactive nuclei is a form of electromagnetic radiation? Gamma γ (wave)
- Which type of radiation emitted by radioactive nuclei has no mass? Gamma
- Which type of radiation emitted by radioactive nuclei is the most penetrating? Gamma (has no mass, moves at spd of light, No charge!)
- Which type of radiation emitted by radioactive nuclei is the slowest moving and least penetrating? Alpha (greatest mass)
- What may happen to a molecule if it is hit by gamma radiation? (ionization) → loss of electrons
damaged or killed (worse) (better)
- What product nucleus would result from the alpha decay of radium-226?
 ${}^{226}_{88}\text{Ra} \rightarrow {}^4_2\text{He} + {}^{222}_{86}\text{Rn}$ ← $(86 + 2 = 88)$
- The isotope ${}^{226}_{88}\text{Ra}$ decays to ${}^{222}_{86}\text{Rn}$ by emitting radiation. Name the type of radiation.
alpha

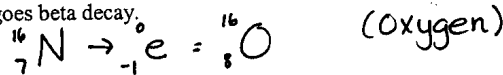
14. The isotope ${}^{63}_{28}\text{Ni}$ decays to ${}^{63}_{29}\text{Cu}$ by emitting radiation. Name the type of radiation.



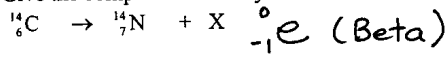
15. The isotope ${}^{99\text{m}}_{43}\text{Tc}$ decays to ${}^{99}_{43}\text{Tc}$ by emitting radiation. Name the type of radiation.



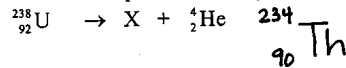
16. Give the complete nuclear symbol for the isotope formed when the isotope ${}^{16}_7\text{N}$ undergoes beta decay.



17. Give the complete nuclear symbol for X in the following equation for radioactive decay.



18. Give the complete nuclear symbol for X in the following equation for radioactive decay.



19. What term is used to describe a radioactive isotope which decays by emitting only a gamma ray?

meta-stable Ex ${}^{99\text{m}}_{43}\text{Tc}$

20. What is meant by the "binding energy" of a nucleus?

Holds nucleus together

21. What fraction of the initial amount of a radioactive isotope still remains after four half-lives?

day 0 → 100% ①
 day 1 → 50% 1/2
 day 2 → 25% 1/4
 day 3 → 12.5% 1/8
 day 4 → 6.25% 1/16

1/16 or 6.25%

22. The half-life of tritium (${}^3_1\text{H}$) is 12 years. How long does it take for 16.0 ng of tritium to decay to the point where 2.0 ng remains?

36 years

16g → 0 days] 12 yr
 8 → 1 day] 12 yr
 4 → 2 day] 12 yr
 2 → 3 day] 12 yr

23. In Einstein's equation, $E = mc^2$, what do E, m and c represent?

E = energy
 m = mass
 c = spd of light

Can only be used as is! No algebra!

24. What is the nuclear process that produces energy in commercial nuclear power plants?

Fission (problem → waste emitted w/ millions yrs 1/2 life) (Fusion explodes!)

25. What kind of reactor produces its own fuel in the process of providing electrical energy?

Breeder Reactor

26. What is the identity of the radioactive isotope involved in radiocarbon dating?

Carbon-14

27. In what important way do cancer cells differ from normal cells?

Radiation damages cells by putting holes in DNA helix in a cell (normal cells are hit but DNA not affected) - Helix tries to repair itself by reproducing cells in places not needed.

28. What term is used to describe radioactive substances which are used as probes to study internal organs?

Tracers

Body can't fight b/c the genetic code is similar!

29. In what part of the body does iodine tend to concentrate?

Thyroid

30. Name any two radioactive isotopes commonly used in nuclear medicine.

(I) Iodine 131 (Tl) Thallium 201 Barium 131 (Ba)
(Tc) Tc-99m (Xe) Xenon 133 Chromium 51 (Cr)

Tracers used to find

31. What type of disease can be conveniently studied using xenon-133 as a tracer?

Pulmonary (lungs) Ex: Emphasema; Lung cancer, ect.

32. What device uses magnetic and electric fields to create high-energy charged particles?

Super conductors → (particle accelerator)

33. What is the term that describes the amount of radiation attributable to our everyday surroundings?

Background Radiation MicroRotegens (7) per hr in LA!

34. What is a film badge?

Badge worn by workers to measure accumulative radioactive exposure (X Ray tech)

35. Which radioactive element is found in some indoor air?

Radon gas

36. What term represents the dosage of toxic material needed to kill 50% of the exposed population in 30 days?

LD₅₀

37. The isotope iodine-131 is used in studies of the

- A) heart
- B) lung
- C) liver
- D) thyroid
- E) kidney

38. The sun's source of energy is nuclear ~~fission~~ fusion

* ~~lecture~~

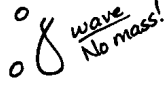
- Difference b/t Beta particle & electrons:
→ Beta particles are "~~popped~~" from nucleus.

Particles!

~~Alpha~~



~~Gamma~~



~~Positron~~



~~Electron~~



* All above radiation "pops" from nucleus!

* ~~lecture~~

