Total ⇒ Add 4200
+ 3.4×10^4
+ 41 800
+ 2.3×10^5
+ 4180
$= 3.1 \times 10^5$ J

7.1 - Atoms & Isotopes

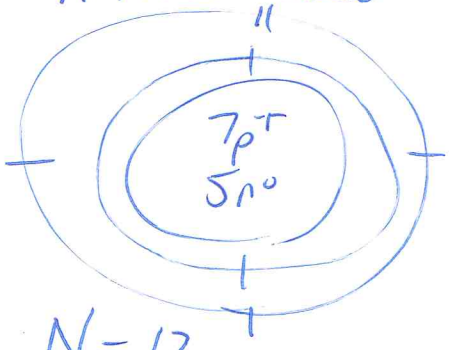
p. 322

p. 322

3, 4, 6, 7, 8, 10

3. Atomic # = 5

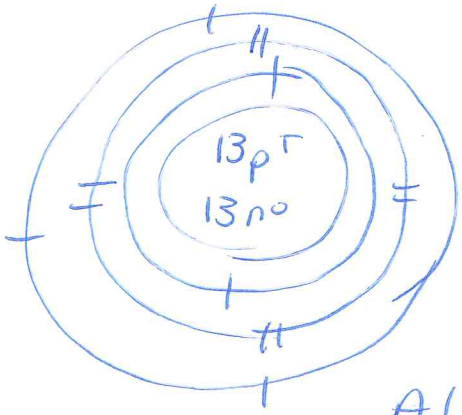
Atomic Mass = 12



N-12

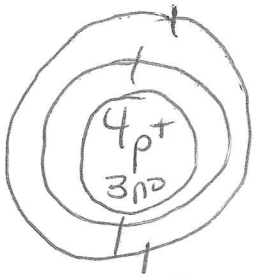
Atomic # = 13

Atomic Mass = 26

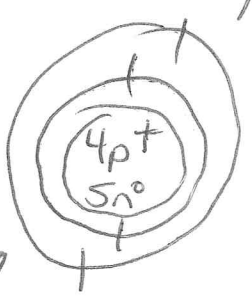


Al-26

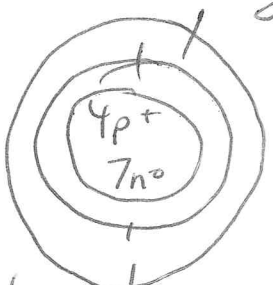
4. all have 4p+ + 4e. only # n° changes



$^{7}_{4}Be$



$^{9}_{4}Be$



$^{11}_{4}Be$

$^{9}_{4}Be$ ← most common b/c Mass on p. table = 9.01

6. a) Si - 28

b) Ne - 22

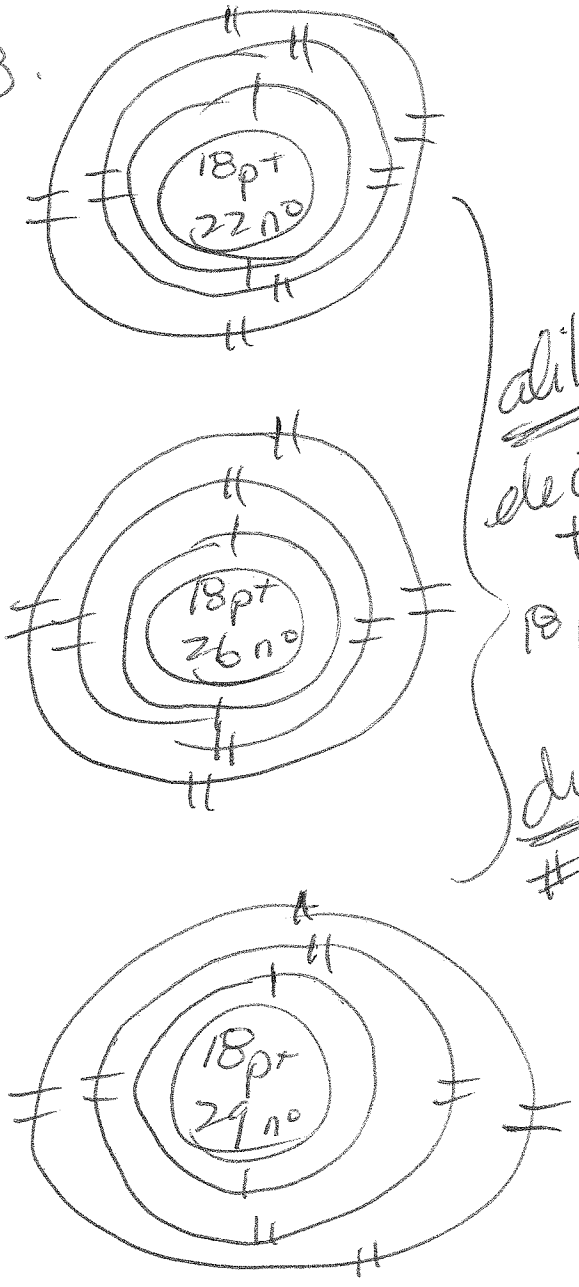
protons identifies element. Add (p^+) + (n^0) to get mass

7. 16 protons ⇒ Sulfur (S)

22 neutrons

38 ∴ S-38

8.



Ar-40 (∴ 40-18 = 22 n°)

alike? electron arrangement + 18 p^+

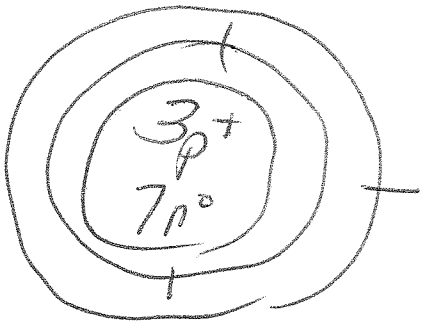
different? # n^0

Ar-44 ∴ 26 n°

Ar-47 ∴ 29 n°

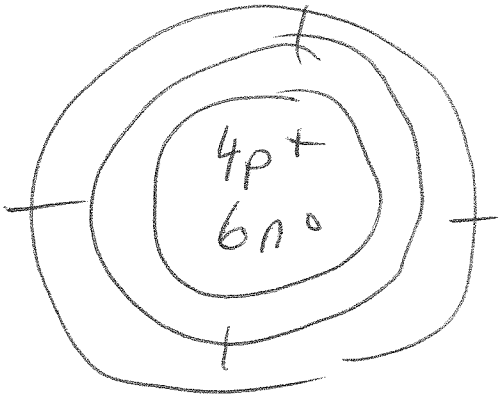
10. Li - 10

(10 - 3 = 7 n°)



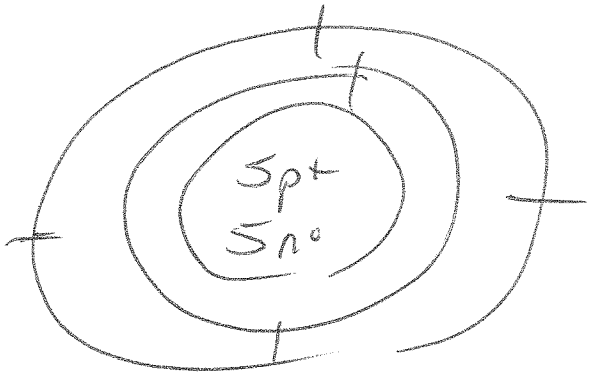
Be - 10

(10 - 4 = 6 n°)



B - 10

(10 - 5 = 5 n°)



Same? - all have Mass of 10

($\#p + \#n = 10$)

different? - # electrons, # protons & # neutrons!

7.2, 7.3 Radioactivity + Half-Lives

p. 329 # 1, 2

328 practice # 1, 2

333 # 4

1. a) $^{248}_{96}Cm \longrightarrow {}^{4}_{2}He + {}^{244}_{94}Pu$ } α decay

b) $^{223}_{88}Ra \longrightarrow {}^{4}_{2}He + {}^{219}_{86}Rn$

2. a) $^{35}_{16}S \longrightarrow {}^{35}_{17}Cl + {}^{0}_{-1}e$ } β^- decay

b) $^{198}_{79}Au \longrightarrow {}^{198}_{80}Tl + {}^{0}_{-1}e$

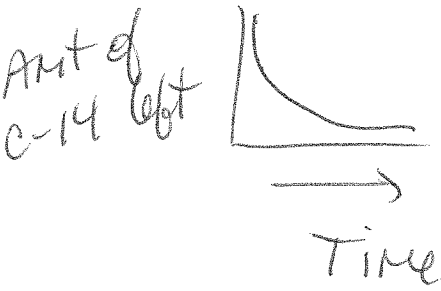
Practice p. 328 #1 $^{240}_{94}Pu^{*} \longrightarrow {}^{240}_{94}Pu + {}^{0}_{0}\gamma$ gamma decay

#2 Not a transmutation as no new element is created.

p. 333 #4

$^{14}_{6}C \rightarrow {}^{14}_{7}N + {}^{0}_{-1}e$ } β^- decay

Ratio of radioactive C-14 to stable C-12 is stable in living organisms. Once dead, the levels of C-14 drop (as the organism is no longer taking in carbon). 1/2 life C-14 is 5370 yrs so predictably the ratio of C-14 : C-12 is reduced by half every 5370 yrs. This info determines how long ago the organism died!



formula used
or
half-life graph

7.4 – Nuclear Energy

p. 341
#'s 2, 7

2. $E = mc^2$

$E = 4.5 \times 10^{14}$ J

$c = 3 \times 10^8$ m/s

$m = ?$

$m = E/c^2 = \frac{4.5 \times 10^{14}}{(3 \times 10^8)^2} = 5 \times 10^{-3}$ kg

$= 5$ g

7. Safety issues with reactors
   - ↳ radiation! in plant
   - ↳ radioactive waste

3 C's → contain ⇒ reaction chamber & any waste is contained in thick layers of protective substance (often lead or concrete)

↳ cooling → Moderator → spreads heat throughout

→ Control rods control rate of rx & therefore temperature

→ control → control rate of reaction so it doesn't get out of control. Done with control rods that absorb neutrons.

CANDU Reactors ⇒ control rods drop into reaction chamber if power goes out & stopping reaction.