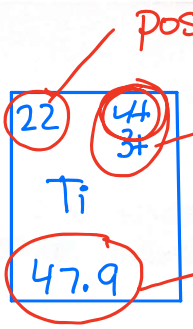


position on the P.T. ; number of protons
number of electrons (if neutral)
ionic charges are the result of a neutral atom losing electrons (+)
atomic mass : average sum of neutrons + protons.

Name:_____
Blk:_____ Date:_____

CHEMISTRY 11
Atomic Number and Atomic Mass

The atomic number of an atom is the number of protons in its nucleus. (22)

The atomic mass of an atom is the number of protons and neutrons in the nucleus of an atom (47.9)

For a NEUTRAL atom, the number of protons equals the number of electrons.

The charge on a proton is positive → Ti .... 22 p^+
The charge on a neutron is neutral → Ti .... 47.9 − 22 = 26 n^0
The charge on an electron is negative

atomic mass
atomic #

Ti = 22e′ Ti^{4+} → 18e′

An ION is formed when you either add or remove **electrons** from/to a neutral atom.

22 − 4 → Ti^{4+} ⇓ 22 − 3 = 19e′

If you **add** electrons the ion will have a negative charge.
If you **remove** electrons the ion will have a positive charge
(subtract)

Exercises 13-17:

13. How many protons are in the nucleus of each of the following?
(a) Be (b) U (c) Mn

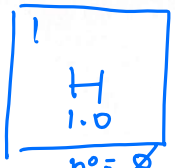
14. How many electrons are there in a neutral atom of each of the following?
(a) C (b) Fe (c) Ar

15. How many electrons are there on each of the following?
(a) Na^+ (c) V^{3+} (e) Cl^- (g) Sb^{3-} (i) H^-
(b) Mg^{2+} (d) O^{2-} (f) Al^{3+} (h) Fe^{2+} (j) As^{3-}

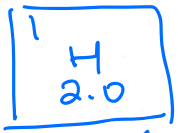
16. What is the ion produced when
(a) two electrons are added to S?
(b) two electrons are removed from Ca?
(c) an electron is added to Cl?
(d) three electrons are removed from Al?
(e) an electron is added to Cr^{3+}?
(f) two electrons are removed from Mn^{2+}?
(g) an electron is removed from V^{4+}?
(h) two electrons are added to Sb^-?
(i) an electron is removed from O^{2-}?

17. What is the charge on the nucleus of each of the following?
(a) Mg (b) Ne (c) K^+ (d) S^{2-}

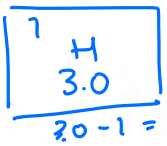
"same"



n° = 0



2.0 - 1 = 1 n°



3.0 - 1 = 2 n°

ISOTOPES are atoms of an element that have the same number of protons but different numbers of neutrons. Therefore, they have the same atomic number but different atomic mass.

Excercise 22: Complete the table. Show the atomic number and atomic mass in the "Symbol" column.

round nearest whole #

	Symbol	Atomic Mass #	Atomic Number	Number of protons	Number of neutrons #	Number of electrons
(a)		84	36			36
(b)				35	45	35
(c)		127	53			54
(d)			27		32	27
(e)	Zn				36	
(f)	Cd^{2+}	112				
(g)				38	50	36
(h)	X^{2-} =				75	54
(i)	X^{3+} =	103				42
(j)	X^{3-} =		33		42	

Calculating atomic masses using a mix of isotope percentages:

The atomic mass of Chlorine is said to be 35.5 grams...we know that it is impossible to have ½ a proton or neutron, so 35.5 grams must represent an **AVERAGE** value for a **MIXTURE** of isotopes.

Example: The atomic mass of 35.5 grams is calculated based on the relative abundance of the following chlorine isotopes

$^{35}Cl = 75.77\ \%$, $^{37}Cl = 24.23\ \%$

$(35 \times 0.7577) + (37 \times 0.2423) = 35.453 = 35.5\ g$

(note: atomic mass is always rounded to the first decimal place)

Exercise 23:

÷100 (10 · 0.188) + (11 · 0.812) = 10.812 g B → 10.8 g B

(a) $^{10}B = 18.8\%$, $^{11}B = 81.2\%$

(b) $^{69}Ga = 60.0\%$, $^{71}Ga = 40.0\%$

(c) $^{107}Ag = 51.8\%$, $^{109}Ag = 48.2\%$

(d) $^{70}Ge = 20.5\%$, $^{72}Ge = 27.4\%$, $^{73}Ge = 7.8\%$, $^{74}Ge = 36.5\%$, $^{76}Ge = 7.8\%$

(e) $^{64}Zn = 48.9\%$, $^{66}Zn = 27.8\%$, $^{67}Zn = 4.1\%$, $^{68}Zn = 18.6\%$, $^{70}Zn = 0.6\%$ ÷100

(f) $^{90}Zr = 51.5\%$, $^{91}Zr = 11.2\%$, $^{92}Zr = 17.1\%$, $^{94}Zr = 17.4\%$, $^{96}Zr = 2.8\%$

(g) $^{92}Mo = 15.8\%$, $^{94}Mo = 9.0\%$, $^{95}Mo = 15.7\%$, $^{96}Mo = 16.5\%$, $^{97}Mo = 9.5\%$, $^{98}Mo = 23.8\%$, $^{100}Mo = 9.6\%$

Extension

If the relative abundance of Gallium is 69.8 g. What is the % abundance of ^{69}Ga and ^{71}Ga

a) 30% and 70% = 70.4 g ✗

b) 70% and 30% = 69.6 g ✗

c) 60% and 40% = 69.8 g ✓

d) 40% and 60% = 70.2 g ✗