

Atoms and Isotopes

1. Consider the data table below:

| atom (or ion) of element | a | b | c | d | e | f | g |
|--------------------------|----|----|----|----|----|----|----|
| number of protons | 12 | 13 | 11 | 12 | 14 | 15 | 10 |
| number of electrons | 12 | 10 | 10 | 12 | 14 | 18 | 10 |
| number of neutrons | 12 | 14 | 12 | 13 | 14 | 16 | 10 |

- a. Which of the above species are negatively charged? _____
- b. Which species are isotopes of the same element? _____
- c. Using your periodic table give the conventional chemical symbol (including charge) for species A, B, and F.

$$a = \text{_____} \quad b = \text{_____} \quad f = \text{_____}$$

2. The element X consists of three isotopes: ^{10}X (25%), ^{11}X (65%), and ^{12}X (10%).

(a) Calculate the average atomic mass of element X.

answer _____ amu

(b) Are there any atoms of element X atoms that weigh your report average atomic mass ? Explain.....

3. How many niobium ($_{41}\text{Nb}$) atoms would it take to equal the mass of 48 magnesium ($_{12}\text{Mg}$) atoms?

4. The element neon (Ne) is found in three isotopic forms: ^{19}Ne (10% abundant), ^{20}Ne (80 % abundant), and ^{21}Ne (10% abundant). Calculate the average atomic mass of Ne. Include the proper units with your answer.

5. How many titanium (Ti) atoms (atomic # 22) would it take to equal the mass of 100 Iridium (Ir) atoms (atomic # 77)? Show your work and circle your answer.

6. Element A is found in three isotopic forms: ^{30}A (14% abundant) and ^{31}A (42% abundant) and ^{34}A (44% abundant). Calculate the average atomic mass of element A and the proper units.

7. What must be done to a neutral chlorine atom in order to change it into Cl^- ?

8. Complete the following table:

| Chemical Symbol | Atomic Number | Number of neutrons | Mass Number | Number of electrons | Net Charge |
|---------------------------|---------------|--------------------|-------------|---------------------|------------|
| | 19 | 20 | | | +1 |
| | | 60 | 106 | | +2 |
| $^{32}_{16}\text{S}^{2-}$ | | | | | |
| | 83 | 126 | | | +3 |

9. Which two fundamental particles (e^- , p^+ , n^0) have about the same mass ?

_____ and _____

10. What fundamental particle accounts for virtually all of an atom's volume ? _____

11. How does Ca differ from Ca^{2+} ?

8. Given a neutral iron atom (Fe), what must be done to it in order to make it into an Fe^{2+} cation?