

Name Key Name _____
 (print name) (sign name)

Please show all work for full credit. This is the "confidence booster". (Avogadro's number = 6.02×10^{23})
 This is the one and only open book, help session, quiz. (1 pt for name), (1 pt per blank, 24 pts)

1. Convert 13.5 kilograms to units of milligrams. Fill in the parenthesis to do this.

$$13.5 \text{ Kg} \times \frac{(1000) \text{ g}}{(1) \text{ Kg}} \times \frac{(1000) \text{ mg}}{(1) \text{ g}} = \frac{(1.35 \times 10^7) \text{ mg}}{\text{or } 13,500,000}$$

2. Convert 35.2 grams of Ca to number of atoms of Ca. To do this complete the following.

a. Give the conversion factor as equivalence by filling in the blank with a number :

40.08 grams of Ca = one mole of Ca \rightarrow $\frac{40.08 \text{ g Ca}}{1 \text{ mol Ca}}$ or $\frac{1 \text{ mol Ca}}{40.08 \text{ g Ca}}$
 one mole of Ca = 6.02×10^{23} atoms of Ca \rightarrow $\frac{1 \text{ mol Ca}}{6.02 \times 10^{23} \text{ atoms Ca}}$ or $\frac{6.02 \times 10^{23} \text{ atoms Ca}}{1 \text{ mol Ca}}$

b. Now fill in the fractions using the conversion factors which you gave in part (a). Remember you are multiplying the starting number by the number one (the numerator is equivalent to the denominator) and the units must cancel out to end up as "atoms of Ca" at the end.

$$35.2 \text{ grams Ca} \times \frac{1 \text{ mol Ca}}{40.08 \text{ g Ca}} \times \frac{6.02 \times 10^{23} \text{ atoms}}{1 \text{ mol Ca}} = 5.29 \times 10^{23} \text{ atoms Ca}$$

3. In the periodic table:

- What is the elemental symbol for nitrogen? N
- What period is element Si in? 3
- What group is the element As in? VA (5A)
- How much does one atom of oxygen weigh? 16.0 amu
- How much does one mole of oxygen weigh? 16.0 grams
- An element symbol for an element which is a transition metal is Cu + many others
- An element symbol for an element which is an Actinide or Lanthanide is Sr + many others
- For an element Mg, the group number is IIA and the charge for the ionic form of Mg is +2
 (show formula if applicable) Charge = group #
- For the element Te, the group number is VIA and the charge for the ionic form of Te is 6-8 = -2
 (show formula if applicable) Charge = group # - 8

Extra credit: (4 pts)

same as
↓ group #

For P (phosphorus) The number of valence electrons (for a neutral atom) is 5 (1/2 pt)

The electron configuration is $1s^2, 2s^2, 2p^6, 3s^2, 3p^3$ (use notation $1s^2$, etc) (1/2 pt)

The valence electron configuration is $3s^2 3p^3$ (use notation $1s^2$, etc) (1/2 pt)
(highest n = principal quantum # = period #)

The number of valence electrons in the molecule PF_3 is 26. Show work. (1/2 pt)

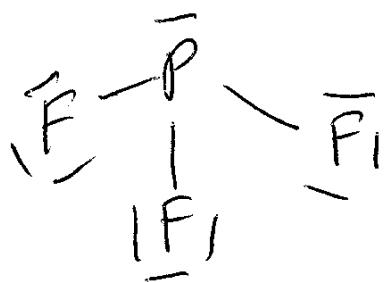
$$\# \text{ valence } e^- = 5 + 3(7) = 26$$

P (group V)

of F

F (group VII)

Draw the Lewis Dot structure of PF_3 . (1 pt)



$$13 \times 2 = 26$$

e in structure

of e pairs

same as # valence e

The VSEPR shape of the molecule is (T-shaped) or (tetrahedral) or (trigonal planar) (circle one) (1 pt)

P has 4 e pairs*
1 lone pair
geometry of e pairs
tetrahedral
geometry of molecules
trigonal pyramidal

e pairs around P = # bonding + # lone pairs
(3) (1)

Pyramidal
4 e pairs around P

Trigonal Pyramidal

Geometry of e = tetrahedral but lone pair e is invisible so geometry of molecule =

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1. Convert 13.5 kilograms to units of milligrams. Fill in the parenthesis to do this.

$$13.5 \text{ Kg} \times \left(\frac{\quad}{\quad} \right) \frac{\text{g}}{\text{Kg}} \times \left(\frac{\quad}{\quad} \right) \frac{\text{mg}}{\text{g}} = \left(\frac{\quad}{\quad} \right) \text{mg}$$

2. Convert 35.2 grams of Ca to number of atoms of Ca. To do this complete the following.

a. Give the conversion factor as equivalence by filling in the blank with a number :

_____ grams of Ca = one mole of Ca

one mole of Ca = _____ atoms of Ca

b. Now fill in the fractions using the conversion factors which you gave in part (a). Remember you are multiplying the starting number by the number one (the numerator is equivalent to the denominator) and the units must cancel out to end up as "atoms of Ca" at the end.

$$35.2 \text{ grams } \frac{\text{Ca}}{1} \times \frac{\quad}{\quad} \times \frac{\quad}{\quad} = \text{_____ atoms Ca}$$

3. In the periodic table:

a. What is the elemental symbol for nitrogen? _____

b. What period is element Si in? _____

c. What group is the element As in? _____

d. How much does one atom of oxygen weigh? _____ amu

e. How much does one mole of oxygen weigh? _____ grams

f. An element symbol for an element which is a transition metal is _____

g. An element symbol for an element which is an Actinide or Lanthanide is _____

4a. For an element Mg, the group number is _____ and the charge for the ionic form of Mg is _____
 (show formula if applicable)

b. For the element Te, the group number is _____ and the charge for the ionic form of Te is _____
 (show formula if applicable)

Extra credit: (4 pts)

For P (phosphorus) The number of valence electrons (for a neutral atom) is _____ (1/2 pt)

The electron configuration is _____ (use notation $1s^2$, etc) (1/2 pt)

The valence electron configuration is _____ (use notation $1s^2$, etc) (1/2 pt)

The number of valence electrons in the molecule PF_3 is _____. Show work. (1/2 pt)

Draw the Lewis Dot structure of PF_3 . (1 pt)

The VSEPR shape of the molecule is (T-shaped) or (tetrahedral) or (trigonal planar) (circle one) (1 pt)