

# Chapter 2 Answer key

2.32 Identify the elements in each chemical formula and tell how many atoms of each are present.

		<u># of each</u>
a. $K_2Cr_2O_7$	K potassium	2
	Cr Chromium	2
	O Oxygen	7

b. $C_5H_8NNaO_4$	C Carbon	5
	H hydrogen	8
	N Nitrogen	1
	Na Sodium	1
	O oxygen	4

c. $C_{10}H_{16}N_2O_3S$	C Carbon	10
	H hydrogen	16
	N Nitrogen	2
	O oxygen	3
	S Sulfur	1

2.34 Identify the element that fits each description.

a. An alkaline earth element in period 3

Mg Magnesium

b. A noble gas in period 6

Rn Radon

c. A main group element in period 3 that has  
p orbitals half-filled with electrons

p 1 1 1      p has 3 orbitals and is  
half filled when it contains  
3e<sup>-</sup>. Looking for 3p<sup>3</sup>

p Phosphorus  
 $1s^2 2s^2 2p^6 3s^2 \boxed{3p^3}$

d. A transition metal in period 4, group 11

Cu Copper

e. An inner transition metal with its  
f orbitals completely filled with electrons.

f  $\uparrow\downarrow \uparrow\downarrow \uparrow\downarrow \uparrow\downarrow \uparrow\downarrow \uparrow\downarrow \uparrow\downarrow$   
7 orbitals for f      Looking for f<sup>14</sup>

Lr Lawrencium

$[\text{Rn}] 7s^2 5f^{14}$

f. A transition metal in period 6, group 10

Pt Platinum

2.54

Give the number of protons, neutrons, and electrons in each element:

	$P^+$	$n^0$	$e^-$
a. $^{115}_{47}\text{Ag}$	47	68	47
b. $^{197}_{79}\text{Au}$	79	118	79
c. $^{222}_{86}\text{Rn}$	86	136	86
d. $^{192}_{76}\text{Os}$	76	116	76

The mass numbers were given as



atomic number is found on periodic Table

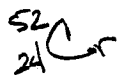
2.56

Write the element symbol that fits each description. Use a superscript for the mass number and a subscript for the atomic number.

a. an element that contains 10 protons and 12 ~~24~~ neutrons.



b. an element with atomic number 24 and mass number 52



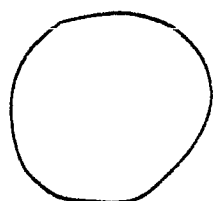
c. an element with 10  $e^-$  and 10 neutrons



2.64

What is the difference between a 2s and 2p orbital?

A 2s orbital is spherical in shape with a node in the middle.

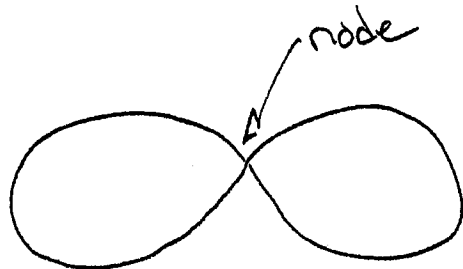


Sphere

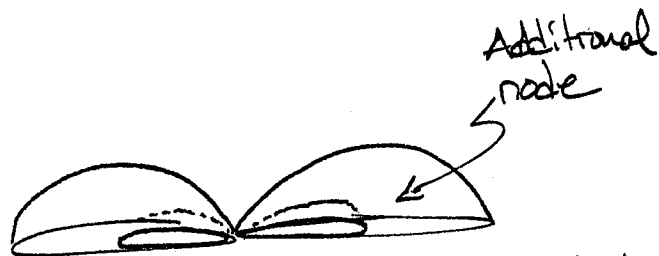


Cutaway

A 2p orbital is dumbbell shaped with a node in the middle - Concentric dumbbells.



dumbbell



Think balloon within balloon

Cutaway

2.68 Why are there 6 columns of p block elements in the periodic table?

p sublevel contains 3 orbitals  
 each orbital can hold 2 electrons  
 each element contributes one additional electron, thus it takes 6 elements to fill the p sublevel

$\uparrow \downarrow \uparrow \downarrow \uparrow \downarrow$  6 electrons required to fill p orbitals.

2.76 Give the total number of electrons, the number of valence electrons, and the identity of the element with each electronic configuration.

	Total e <sup>-</sup>	valence e <sup>-</sup>	ID
a. $1s^2 2s^2 2p^6 3s^2 3p^6$	18	8	Ar
b. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^7$	27	2	Co
c. $1s^2 2s^2 2p^3$	7	5	B
d. $[Kr] 5s^2 4d^{10} 5p^2$	50	4	Sn

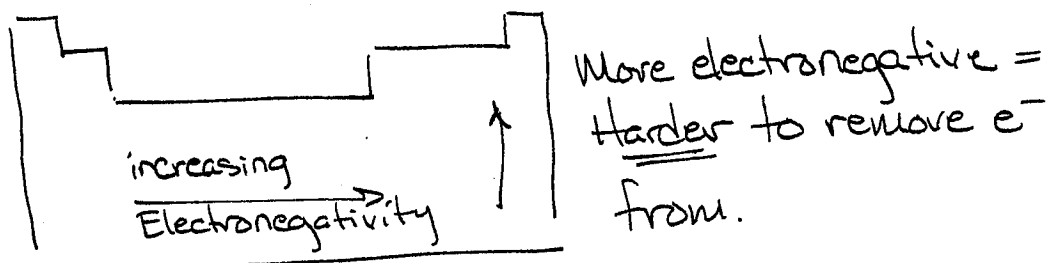
\* valence e<sup>-</sup> are the sum of the e<sup>-</sup> in only the highest principal energy level  
 ex from d

Filling Order  $[Kr] 5s^2 4d^{10} 5p^2$

Numerical Order  $[Kr] 4d^{10} 5s^2 5p^2$

Valence e<sup>-</sup>  
 Total 4

2.96 For each pair of elements in prob. 2.94, label the element from which it is easier to remove an electron.



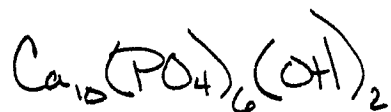
- a. Na or Mg      Sodium to left of Magnesium
- b. C or F      Carbon to left of fluorine
- c. Ne or Kr      krypton below neon
- d. Ar or Br      bromine to left of argon

2.106 Strontium-90 ( $^{90}_{38}\text{Sr}$ ) is a radioactive element formed in nuclear reactors. When an unusually high level of strontium is released into the air, such as occurred during the Chernobyl nuclear disaster in 1986, the strontium can be incorporated into bones of the exposed individuals. High levels of strontium can cause bone cancer and leukemia. Why does strontium-90 cause this particular health problem?

Bone is composed of a mineral called hydroxylapatite with formula  $\text{Ca}_{10}(\text{PO}_4)_6(\text{OH})_2$ . Ca and Sr are both group IIA elements with similar chemical reactivities.  $^{90}\text{Sr}$  inserts in place of calcium in the hydroxylapatite

## 2.106 Cont

Normal Bone



Contaminated Bone



↑  
inserted in place of a  $\text{Ca}^{2+}$  ion

Once in the bone the  $^{90}\text{Sr}$  is stored in the body and not flushed out. When the  $^{90}\text{Sr}$  ~~radiates~~ ~~its~~ radioactively degrades it gives off a high energy radiation that damages nearby DNA and causes cancer.