

2.3: Module 3 Practice

Exercise 2.3.1

For each isotope shown, give the number of protons, neutrons, and electrons.

- a) $^{19}_9\text{F}^{1-}$
- b) $^{52}_{24}\text{Cr}^{3+}$
- c) $^{31}_{15}\text{P}^{3-}$

Answer a

9 protons, 10 neutrons, 10 electrons

Answer b

24 protons, 28 neutrons, 21 electrons

Answer c

15 protons, 16 neutrons, 18 electrons

Exercise 2.3.1

Given the number of protons, neutrons, and electrons, what would be the mass number and the charge number of each isotope? What would be the atomic number? The identity of the element?

- d) 14 protons, 15 neutrons, 14 electrons
- e) 3 protons, 4 neutrons, 2 electrons
- f) 30 protons, 36 neutrons, 28 electrons

Answer d

Mass number is 29, charge is 0. Atomic number is 14, identity is silicon (Si).

Answer e

Mass number is 7, charge is +1. Atomic number is 3, identity is lithium (Li).

Answer f

Mass number is 66, charge is +2. Atomic number is 30, identity is zinc (Zn).

Exercise 2.3.1

For each element shown, tell what charge it has when it forms an ion.

- g) S
- h) Ag
- i) Ca

Answer g

-2

Answer h

+1

Answer i

+2

Exercise 2.3.1

Give the electron configuration for each of the following atoms.

j) Mg

k) Mn

l) Sr

Answer j

$1s^2 2s^2 2p^6 3s^2$ (total of 12 electrons)

Answer k

$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^5$ (total of 25 electrons)

Answer l

$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2$ (total of 38 electrons)

Exercise 2.3.1

Give the electron configuration for each of the following ions.

m) N^{3-}

n) S^{2-}

o) Rb^{1+}

Answer m

$1s^2 2s^2 2p^6$ (total of 10 electrons)

Answer n

$1s^2 2s^2 2p^6 3s^2 3p^6$ (total of 18 electrons)

Answer o

$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6$ (total of 36 electrons)

Exercise 2.3.1

K Ca

Rb Sr

Out of the four elements listed above, choose the one that has

j) the largest radius

k) the least ionization energy

l) the most metallic character

Answer j

Rb

Answer k

Rb

Answer l

Rb

Exercise 2.3.1

The element chlorine is found in nature as a mixture of ^{35}Cl and ^{37}Cl . Given that the average atomic mass of chlorine is 35.45 amu, which isotope is more abundant?

Answer

^{35}Cl is more abundant. Since the average mass is closer to 35 amu, you have more of the isotope with a mass of 35 amu than you do of the isotope with a mass of 37 amu.

Exercise 2.3.1

If there were chemists on another planet, their periodic table might be different because the elements might have different "natural" abundances. If on the other planet, the element sulfur had the following natural abundances, calculate the average atomic mass that the chemists on that planet would use.

68.44 % is ^{32}S with mass of 31.9721 amu

23.24 % is ^{33}S with mass of 32.9715 amu

8.32 % is ^{34}S with mass of 33.9679 amu

Answer

Add up (uncertain digits are underlined):

21.8817amu

7.6626 amu

2.8261 amu

Total is 32.3704 amu which rounds to 32.37 amu

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