

Name _____

Date _____

Date due _____

Science 10 - Assignment on Atoms and Ions

NOTE: This assignment is based on material given in the Power Point presentation called "Sc 10 - Atoms and Ions"

1. Considering an oxygen-18 atom and an oxygen-18 ion, label the following as true or false:

- _____ They both have the same number of protons
- _____ The oxygen atom has more electrons than the ion
- _____ The oxygen atom has less electrons than the ion
- _____ The oxygen atom has 10 neutrons
- _____ The oxygen ion has 10 neutrons
- _____ The oxygen atom has more protons than the ion
- _____ The oxygen atom and ions both have 8 neutrons
- _____ The oxygen ion and atom both have 8 electrons
- _____ The oxygen ion and atom both have 10 electrons
- _____ The oxygen ion has 10 electrons while the atom has 8 electrons
- _____ The oxygen ion has 8 electrons while the atom has 10 electrons
- _____ The net charge on the oxygen ion is "0"
- _____ The net charge on the oxygen ion is "-2"
- _____ The net charge on the oxygen ion is "+2"
- _____ The Bohr model of the oxygen atom has 6 electrons in the outer ring
- _____ The Bohr model of the oxygen atom has 8 electrons in the outer ring
- _____ The Bohr model of the oxygen ion has 8 electrons in the outer ring
- _____ Oxygen-16 and oxygen-18 atoms are two different isotopes of oxygen with different numbers of protons
- _____ Oxygen-16 and oxygen-18 atoms are two different isotopes of oxygen with different numbers of neutrons

2. Considering a ^{26}Mg atom and a $^{26}\text{Mg}^{2+}$ ion, label the following as true or false:

- _____ They both have the same number of protons
- _____ The magnesium atom has more electrons than the ion
- _____ The magnesium atom has less electrons than the ion
- _____ The magnesium atom has 14 neutrons
- _____ The magnesium ion has 12 neutrons

- _____ The magnesium atom has more protons than the ion
- _____ The magnesium atom and ion both have 12 neutrons
- _____ The magnesium ion and atom both have 12 electrons
- _____ The magnesium ion and atom both have 10 electrons
- _____ The magnesium ion has 10 electrons while the atom has 12 electrons
- _____ The magnesium ion has 10 electrons while the atom has 14 electrons
- _____ The net charge on the magnesium ion is "0"
- _____ The net charge on the magnesium ion is "-2"
- _____ The net charge on the magnesium ion is "+2"
- _____ The Bohr model of the magnesium atom has 2 electrons in the outer occupied ring
- _____ The Bohr model of the magnesium ion has 8 electrons in the outer occupied ring
- _____ The Bohr model of the magnesium ion has 0 electrons in the outer occupied ring
- _____ Magnesium-24 and magnesium-26 atoms are two different isotopes of magnesium with different numbers of protons
- _____ Magnesium-24 and magnesium-26 atoms are two different isotopes of magnesium with different numbers of neutrons

3. When forming stable ions:

- a) a calcium atom will (*lose/gain*) _____, (#) _____ electrons
- b) a scandium atom will (*lose/gain*) _____, (#) _____ electrons
- c) a phosphorus atom will (*lose/gain*) _____, (#) _____ electrons
- d) a nickel atom will (*lose/gain*) _____, (#) _____ or _____ electrons
- e) a cadmium atom will (*lose/gain*) _____, (#) _____ electrons
- f) a fluorine atom will (*lose/gain*) _____, (#) _____ electron
- g) a calcium atom will (*lose/gain*) _____, (#) _____ electrons
- h) a selenium atom will (*lose/gain*) _____, (#) _____ electrons
- i) an arsenic atom will (*lose/gain*) _____, (#) _____ electrons

4. Fill in the blanks in the following statements:

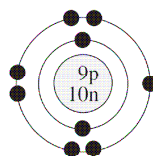
- a) When forming H^+ , a hydrogen atom has (*gained/lost*) _____ one electron
- b) When forming Fe^{2+} , an iron atom has (*gained/lost*) _____ (#) _____ electrons
- c) When forming S^{2-} , a sulphur atom has (*gained/lost*) _____ (#) _____ electrons
- d) When forming Ag^+ , a silver atom has (*gained/lost*) _____ (#) _____ electrons
- e) When forming Ge^{4+} , a germanium atom has (*gained/lost*) _____ (#) _____ electrons
- f) When forming F^- , a fluorine atom has (*gained/lost*) _____ (#) _____ electrons
- g) When forming Al^{3+} , an aluminum atom has (*gained/lost*) _____ (#) _____ electrons
- h) When forming N, a nitrogen ion has (*gained/lost*) _____ (#) _____ electrons
- i) When forming Y, a yttrium ion has (*gained/lost*) _____ (#) _____ electrons
- j) When forming Au, a gold (III) ion has (*gained/lost*) _____ (#) _____ electrons

5. The species $^{104}\text{Rh}^{3+}$ has _____ protons, _____ neutrons and _____ electrons.
6. The species $^{103}\text{Rh}^{3+}$ has _____ protons, _____ neutrons and _____ electrons.
7. The species $^{12}\text{C}^+$ has _____ protons, _____ neutrons and _____ electrons.
8. The species ^{12}C has _____ protons, _____ neutrons and _____ electrons.
9. The species $^{140}\text{Ce}^{4+}$ has _____ protons, _____ neutrons and _____ electrons.
10. The species $^{243}\text{Am}^{6+}$ has _____ protons, _____ neutrons and _____ electrons.
11. The species $^{210}\text{At}^-$ has _____ protons, _____ neutrons and _____ electrons.
12. The species $^{130}\text{Te}^{2-}$ has _____ protons, _____ neutrons and _____ electrons.
13. The species ^{251}Cf has _____ protons, _____ neutrons and _____ electrons.
14. For the species $^{94}\text{Zr}^{4+}$, the "94" is called the _____ number and is the total number of _____ + _____, the "4+" is the net _____, and it means there are (#) _____ (more/less) _____ (electrons/neutrons) _____ than protons. The atomic number of this species is _____, the same as the number of _____. This species has _____ electrons.
15. For the species $^{126}\text{Te}^{2-}$, the "126" is called the _____ number and is the total number of _____ + _____, the "2-" is the net _____, and it means there are (#) _____ (more/less) _____ (electrons/neutrons) _____ than protons. The atomic number of this species is _____, the same as the number of _____. This species has _____ electrons.
16. Which atom will produce an ion with 15 protons, 16 neutrons and 18 electrons?

17. Which element will produce an ion with 20 protons, 20 neutrons and 18 electrons?

18. An ion has 83 protons, 127 neutrons and 80 electrons. What is the mass number of the ion? _____. What is the atomic number? _____. What is the net charge on the ion? _____. Is this a cation or an anion? _____.

19. Which neutral atom has 14 neutrons and 12 electrons? _____
20. Which neutral atom has 151 neutrons and 96 electrons? _____
21. The charge on an ion is "3-" and it has 36 electrons. What is the element? _____
22. The charge on an ion is "2+" and it has 54 electrons. What is the element? _____
23. The charge on an ion is "4+" and it has 22 electrons. What is the element? _____
24. Given: ${}^7_3?$, a neutral atom of this is the element _____ and it has _____ electrons, _____ protons and _____ neutrons.
25. Given: ${}^7_3?$, an ion of this element with a net charge of "+" would have _____ electrons, _____ protons and _____ neutrons.
26. An isotope has 63 protons, 89 neutrons and 60 electrons:
- Write the nuclear notation for this isotope: (eg. a nuclear notation is ${}^{14}_7N^{3-}$)
 - What is the name of the element? _____
 - Is this an atom or an ion? _____
 - What is the mass number of this isotope? _____
 - What is the atomic number? _____
 - What is the net charge? _____
27. An isotope 7 protons, 7 neutrons and 10 electrons:
- Write the nuclear notation for this isotope: (eg. a nuclear notation is ${}^{14}_7N^{3-}$)
 - What is the name of the element? _____
 - Is this an atom or an ion? _____
 - What is the mass number of this isotope? _____
 - What is the atomic number? _____
 - What is the net charge? _____
28. Consider the following diagram:



- What is the mass number? _____
- Is this neutral? _____
- What is the name of the element? _____

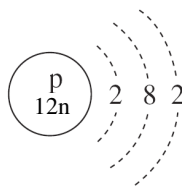
29. An isotope 106 protons, 157 neutrons and 106 electrons:

- Write the nuclear notation for this isotope: (eg. a nuclear notation is ${}^{14}_7\text{N}^{3-}$)
- What is the name of the element? _____
- Is this an atom or an ion? _____
- What is the mass number of this isotope? _____
- What is the atomic number? _____
- What is the net charge? _____

30. An isotope 29 protons, 34 neutrons and 28 electrons:

- Write the nuclear notation for this isotope: (eg. a nuclear notation is ${}^{14}_7\text{N}^{3-}$)
- What is the name of the element? _____
- Is this an atom or an ion? _____
- What is the mass number of this isotope? _____
- What is the atomic number? _____
- What is the net charge? _____

31. Given the diagram:



- This is one example of a _____ model
- If this is a neutral atom, how many protons are there? _____
- What is the name of the element? _____
- What is the mass number? _____
- What is the atomic mass of this element? (*Hint: Where do you look?*) _____
- This atom will easily (*gain/lose*) _____ (#) _____ electrons when forming a stable ion. This stable ion will have a net charge of _____ and its symbol is _____

32. Given the nuclear notation: ${}^{27}_{13}\text{?}^{3+}$

- The name of the element is _____
- This isotope has _____ protons, _____ neutrons and _____ electrons
- Is this an atom or an ion? _____
- What is the net charge? _____
- In order to form this, the neutral atom must have (*gained/lost*) _____ (#) _____ electrons.

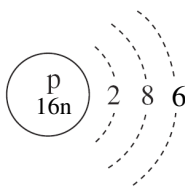
33. Label the following statements about Zn^{2+} as true or false.

		T or F
I	It symbolizes an ion.	
II	It symbolizes an atom.	
III	Zinc has lost electrons.	
IV	Zinc has gained electrons.	

34. Label the following statements about Br^- as true or false.

		T or F
I	It symbolizes an ion.	
II	It symbolizes an atom.	
III	Bromine has lost electrons.	
IV	Bromine has gained electrons.	

35. Given the diagram:



- This is one example of a _____ model
- If this is a neutral atom, how many protons are there? _____
- What is the name of the element? _____
- What is the mass number? _____
- What is the atomic mass of this element? (*Hint: Where do you look?*) _____
- This atom will easily (*gain/lose*) _____ (#) _____ electrons when forming a stable ion. This stable ion will have a net charge of ____ and its symbol is _____

36. Given the nuclear notation: ${}_{34}^{79}\text{S}^{2-}$

- The name of the element is _____
- This isotope has ____ protons, ____ neutrons and ____ electrons
- Is this an atom or an ion? _____
- What is the net charge? _____
- In order to form this, the neutral atom must have (*gained/lost*) _____ (#) _____ electrons.

37. a) Define *mass number* _____
- b) Define an *ion* _____
- c) Different *isotopes* have different numbers of _____.
- d) Bohr models show the arrangement of _____ in orbits.