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AP Chemistry – The End of the Beginning – 9

Name _____Per ___

1. What is the trend in first ionization energies as you move down group VII? How does this trend compare with atomic radii?

2. Use electron configuration and effective nuclear charge to explain which element has the larger first ionization energy, Si or C.

3. A 15.0 cm long cylindrical glass tube, sealed at one end, if filled with ethanol. The mass of ethanol needed to fill the tube is found to be 11.86 g. The density of ethanol is 0.789 g/mL. Calculate the inner diameter of the tube in centimeters.

4. Fill in the gaps in the following table:

Symbol:	$^{102}Ru^{3+}$				Ce
Protons:		34	76		
Neutrons:		46	116	74	82
Electrons:		36		54	
Net charge:			2+	1-	3+

5. From the following list of elements, Ar, H, Ga, Al, Ca, Br, Ge, K, and O, pick the one that best fits each description; use each element only once:

(a) an alkali metal

(b) an alkaline earth metal

(c) a noble gas

(d) a halogen

(e) a metalloid

(f) a nonmetal in group I

(g) a metal that forms a 3+ ion

(h) a nonmetal that forms a 2- ion

(i) an element that resembles aluminum

6. What is the (a) energy, (b) frequency (c) wavelength (in nm) and (d) region of the electromagnetic spectrum of radiation emitted by a Hydrogen atom when an electron at n = 4 drops to n = 2?

7. What are the four quantum numbers for:

(a) the 35^{th} electron of Br

(b) the 43^{rd} electron of Tc

(c) the 12^{th} electron of Mg

(d) the 68^{th} electron of Er

8. The following elements have the following characteristic emission wavelengths:

Ag	328.1 nm
Au	267.6 nm
Ba	455.4 nm
Ca	422.7 nm
Cu	324.8 nm
Fe	373.0 nm
K	404.7 nm
Mg	285.2 nm
Na	589.6 nm
Ni	341.5 nm

(a) Label the elements in the above list that emit radiation in the visible part of the spectrum.
(b) Label the elements in the above list that emit radiation in the ultraviolet part of the spectrum.
(c) Label the element which emits photons of highest energy.
(d) Label the element which emits photons of lowest energy.
(e) Which sample corresponds to light of frequency 6.59×10^{14} Hz?