**Topics in Chemistry Practice Midterm Questions**

1) a. The number of electrons is equal to the number of protons, which is equal to the atomic number of an element.

2) b. The number of neutrons plus the number of protons is equal to the isotopic mass. If the isotopic mass is 243 and plutonium has 94 protons (the same as the atomic number), the numbe of neutrons is 149.

3) b. Ruthenium has 44 protons, so if it has 56 neutrons it has a mass of 100 amu.

4) a. Neutrons stabilize the protons in the nucleus, and different amounts of protons can make this happen.

5) c. Protons + neutrons = atomic mass

6) d. The weighting allows more abundant isotopes to count more toward the average atomic mass.

7) d. It’s a continuous rainbow, which is where it gets its name.

8) a. It’s where electrons live!

9) a. Low energy = ground state, while high energy = excited state.

10) b. Orbitals can only hold three electrons.

11) d. These are all features of the Bohr atom.

12) c. Energy has nothing to do with distance from the nucleus.

13) a. Numerical data is quantitative, nonnumerical data is qualitative.

14) d. Good hypotheses involve a good guess about what might happen under some circumstances. In this case, b and c are both reasonable, while in a there’s no relationship between the cause and effect.

15) c. Balances measure mass. Graduated cylinders measure volume.

16) d. Goggles!

17) a. Temperature in SI units are Kelvin (K).

18) b.

19) Oops… made a mistake on this one. Should be 0.000087, which isn’t even an option.

20) d. Precision measures how reproducibly something can be measured, while accuracy is when the measured answer is the same as the actual answer.

21) b.

22) a. Significant figures indicate precision. There’s no way to measure accuracy as you can never know if your measurement is accurate at all.

23) d.

24) b. Electrons weren’t part of atomic models until Thomson’s plum pudding model.

25) b. Plum pudding didn’t involve orbitals.

26) c. They’re extremely reactive, second in metals only to alkali metals.

27) a. Halogens are used for this purpose due to their high reactivity.

28) b. Just count back to the last noble gas!

29) a. Metals and nonmetals have very different properties.

30) a. If an atom loses electrons it forms a positively charged cation. If an atom gains electrons it becomes a negatively charged anion.

31) d. For compounds to be flammable they need C and H, neither of which is generally found in ionic compounds.

32) a. The entire basis for the properties of ionic compounds is that the cations and anions are tightly held together in big, strong crystals. Covalent compounds, on the other hand, have properties based on the fact that they form molecules that don’t interact much.

33) c. It really wants to gain electrons!

34) a. The columns of the periodic table can be interchangeably referred to as families or groups. The rows are called periods.

35) b. Elements gain electrons to be like the nearest noble gas and anions if they lose them, which is the exact opposite of selection b.

36) d. Both sodium acetate and copper(II) sulfate are ionic compunds.

37) a. Moving ions = electricity.

38) d. See the explanation for 32 above.

39) b. Count three across to be like Ar.

40) d. The Roman numeral indicates the positive charge, so II will be higher than I.

41) d. These all describe the losses of electrons.

42) b. See the explanation for 32 above.

43) copper(II) sulfate

44) hydrosulfuric acid (which we didn’t go over – sorry about that)

45) carbon (didn’t go over)

46) dinitrogen tetrasulfide (didn’t go over)

47) NH3 (didn’t go over)

48) NF3 (didn’t go over)

49) Co2O3

50) S8 (didn’t go over)

51) CH4 (didn’t go over)

52) Mg(HCO3)2