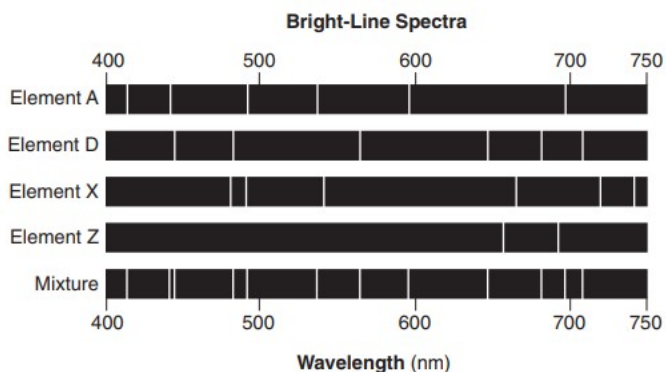51 Convert the melting point of mercury to degrees Celsius.

52 Draw a Lewis electron-dot diagram for a molecule of hydrogen fluoride, HF.

53 Show a numerical setup for calculating the quantity of heat in joules required to completely vaporize 102.3 grams of $H_2O_{(L)}$ at 100.°C and 1.0 atm.

54 State the color of methyl orange indicator after the indicator is placed in a solution of 0.10 M $NH_{3(AQ)}$.

Base your answers to questions 55 and 56 on the information below & on your knowledge of chemistry. The bright-line spectra for four elements and a mixture of elements are shown in this diagram.

Bright-Line Spectra

55 Write the letter of each element present in the mixture.

56 Explain, in terms of electrons and energy states, how the light emitted by excited atoms is produced.

_____

Rubidium and iodine have different chemical and physical properties. Some of these properties are shown in this table
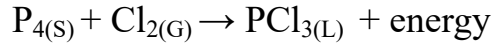
Some Physical and Chemical Properties of Rubidium and Iodine	
Rubidium	iodine
silvery-white solid	bluish-black lustrous solid
forms ionic compounds with nonmetals	forms ionic bonds with active metals
reacts with oxygen in the air	sublimes at room temperature
specific heat = 0.363 J/g•K	specific heat = 0.363 J/g•K

57 State the chemical property of iodine listed in this table.

58 Compare the atomic radius of an atom of iodine to the atomic radius of an atom of rubidium when both atoms are in the ground state.

59 Compare the electrical conductivity of these two elements at STP.

Given the *unbalanced* equation showing the reactants and product of a reaction occurring at 298 K and 100. kPa:

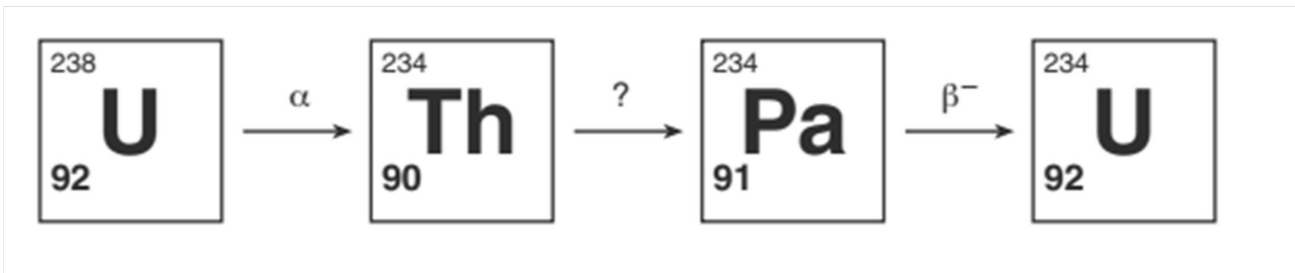$$P_{4(S)} + Cl_{2(G)} \rightarrow PCl_{3(L)} + energy$$

60 Balance this equation using the smallest whole number coefficients.

61 State why this reaction is a synthesis reaction.

62 Show a numerical setup for calculating the percent composition by mass of chlorine in $PCl_{3(L)}$ (gram-formula mass = 137 g/mol).

The diagram below shows the first three steps in the uranium-238 radioactive decay series.

The decay mode for the first and third steps is shown above the arrows. The decay mode for the second step is not shown in the diagram. Thorium-234 has a half-life of 24.10 days.

63 Explain, in terms of neutrons and protons, why U-238 and U-234 are different isotopes of uranium.

64 Identify the decay mode particle emitted from the Th-234.

65 Determine the total time that must elapse until only one-sixteenth of an original sample of Th-234 remains unchanged.