Part C

Answer all questions in this part.

Directions (66–85): Record your answers in the spaces provided in your answer booklet. Some questions may require the use of the *2011 Edition Reference Tables for Physical Setting/Chemistry*.

Base your answers to questions 66 through 69 on the information below and on your knowledge of chemistry.

Before atomic numbers were known, Mendeleev developed a classification system for the 63 elements known in 1872, using oxide formulas and atomic masses. He used an R in the oxide formulas to represent any element in each group. The atomic mass was listed in parentheses after the symbol of each element. A modified version of Mendeleev's classification system is shown in the table below.

Modified Version of Mendeleev's Table

Group →		I	II	III	IV	V	VI	VII
Oxide formulas		R_2O	RO	R_2O_3	RO_2	R_2O_5	RO_3	R_2O_7
Series	1	H(1)						
	2	Li(7)	Be(9.4)	B(11)	C(12)	N(14)	O(16)	F(19)
	3	Na(23)	Mg(24)	Al(27.3)	Si(28)	P(31)	S(32)	Cl(35.5)
	4	K(39)	Ca(40)		Ti(48)	V(51)	Cr(52)	Mn(55)
	5	Cu(63)	Zn(65)			As(75)	Se(78)	Br(80)
	6	Rb(85)	Sr(87)	Yt(88)	Zr(90)	Nb(94)	Mo(96)	
	7	Ag(108)	Cd(112)	In(113)	Sn(118)	Sb(122)	Te(125)	I(127)
	8	Cs(133)	Ba(137)	Di(138)	Ce(140)			

66 Identify *one* characteristic used by Mendeleev to develop his classification system of the elements. [1]

67 Based on Mendeleev's oxide formula, what is the number of electrons lost by each atom of the elements in Group III? [1]

68 Based on Table *J*, identify the *least* active metal listed in Group I on Mendeleev's table. [1]

69 Explain, in terms of chemical reactivity, why the elements in Group 18 on the modern Periodic Table were *not* identified by Mendeleev at that time. [1]

Base your answers to questions 73 through 76 on the information below.

The table below lists physical and chemical properties of six elements at standard pressure that correspond to known elements on the Periodic Table. The elements are identified by the code letters, *D*, *E*, *G*, *J*, *L*, and *Q*.

Properties of Six Elements at Standard Pressure

Element D Density 0.00018 g/cm^3 Melting point –272°C Boiling point –269°C Oxide formula (none)	Element E Density 1.82 g/cm^3 Melting point 44°C Boiling point 280°C Oxide formula E_2O_5	Element G Density 0.53 g/cm^3 Melting point 181°C Boiling point 1347°C Oxide formula G_2O
Element J Density 0.0013 g/cm^3 Melting point –210°C Boiling point –196°C Oxide formula J_2O_5	Element L Density 0.86 g/cm^3 Melting point 64°C Boiling point 774°C Oxide formula L_2O	Element Q Density 0.97 g/cm^3 Melting point 98°C Boiling point 883°C Oxide formula Q_2O

73 What is the total number of elements in the "Properties of Six Elements at Standard Pressure" table that are solids at STP? [1]

74 An atom of element *G* is in the ground state. What is the total number of valence electrons in this atom? [1]

75 Letter *Z* corresponds to an element on the Periodic Table other than the six listed elements. Elements *G*, *Q*, *L*, and *Z* are in the same group on the Periodic Table, as shown in the diagram below.

G
Q
L
Z

Based on the trend in the melting points for elements *G*, *Q*, and *L* listed in the "Properties of Six Elements at Standard Pressure" table, estimate the melting point of element *Z*, in degrees Celsius. [1]

76 Identify, by code letter, the element that is a noble gas in the "Properties of Six Elements at Standard Pressure" table. [1]