

62/64 = 97% Excellent.

Benjamin - Hello, it's Bob here with a note re my marking: I use a check mark to indicate a mark earned and an x to indicate a missed mark. To speed calculating, I only include numbers where you have missed marks.

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63. Dear Prime Minister Harper,

The greenhouse gas effect is worsening for the Earth's atmosphere. Mr. Harper, you are not recommended to implement a federal Carbon Tax based on the amount of carbon dioxide that is emitted.

The Carbon Tax requires that the consumer pay an extra tax when ordering gasoline or diesel. This has occurred in both British Columbia and Quebec. Quite simply, "It puts a price on each tonne of GHG emitted, sending a price signal that will, over time, elicit a powerful market response across the entire economy, resulting in reduced emissions." (Ministry of Finance in British Columbia) The carbon tax raises the cost of gasoline from 4.62 to 7.83 cents per liter in BC (Ministry of Finance in British Columbia). All the money is given back to the taxpayers and, in BC, over \$500 million was supplied. The carbon tax is meant to encompass the largest base possible, taxing individuals wherever there may be possible greenhouse emissions.

One difficulty that the carbon tax represents is to not allow people to be double taxed in BC and in Quebec. Therefore, to ensure that a federal tax law be implemented, the government will need to have the bill signed after the Quebec and BC tax laws have become exempt. For the tax laws to become exempt in Quebec and BC, the federal carbon tax law will need to at least be implemented at both the BC standard and the Quebec standard as to "replace" their carbon tax.

An advantage to implementing the carbon tax will be that taxpayers will opt for transport via public transit. A disadvantage to this is that individuals in rural areas will not have this advantage. There is also another disadvantage when the transit systems are taxed. The transit systems may increase the cost per ticket or pass and thereby making the advantage for taxpayers to use public transit redundant. Therefore there would need to be a provincial transit law to counter a raise in cost of transit based on a federal carbon tax.

Another advantage is that the carbon tax law will not be a source of revenue for the government; the carbon tax is considered revenue-neutral. All money collected by the government is rightfully given back to the taxpayers.

In summary, you are not recommended to instill a federal carbon tax law due the disadvantages of tracking and maintaining all ten provinces including Quebec and BC. The carbon tax law should be evangelized to all respective premiers of the provinces and not at the federal level.

Ben A. Morgan

Well written. References missing.

14/16

64. a) The difference between a solid and a gas is that in a solid the particles are closer together while the particles in a gas are farther apart. Since the molecules in a solid have a large electromagnetic attraction, they are held closer together. The opposite is true for a gas where they are farther apart because they have a weak electromagnetic attraction. A solid exerts pressure through a continuous physical force when it has come into contact with something.

✓✓✓✓✓✓

b) Condensation is the process in which the kinetic energy of a molecule decreases to a point where the molecule is at a temperature that allows it to establish weak intermolecular bonds. A physical structure appears, but it is easily changeable and it is also not rigid. ✓✓✓

Please leave several lines of space between questions and parts of questions. That will help your answers stand out when you check your work. It will help your marker too, as we will not have to move your text down to grade and comment. That also means your diagrams will be kept together, resulting in better marks all round. Thanks!

65. The manual warns to not check the tires pressure while it is hot because the pressure that is inside of the tire changes depending on its temperature. If a person were to read the pressure of a tire while it was hot, the pressure would be higher than normal. The pressure increases because the particles want to move further away from each other and that was caused from the temperature increasing. If a person lets the tire sit and cool to room temperature, then the reading will show its truest pressure and describe, at its lowest temperature, if it needs more air. ✓✓✓

66. If a balloon is left inside of a car on a hot day, it will expand. If the balloon is already blown-up with gas inside, it may explode due to the increase in pressure that the hot air would cause. If the balloon is simply lying on the back seat with its neck knotted and not blown up, a person might find that the balloon will have somehow have "gained" air. Although it has not "gained" air, the increase in temperature has caused the outward pressure of the gas inside the balloon to increase, therefore causing it to expand. If the

balloon is not knotted at the neck, then it will have not increased in volume since the particles can freely flow in and out of the balloon. ✓✓✓✓ Good.

67. a) Boyle's Law
b) Gay-Lussac's Law
c) Charles's Law ✓✓✓

68. The number of moles of a gas affects the volume of that gas because every mole has pressure. When the amount of moles increase inside of a container that is expandable (i.e. a balloon), the container will expand since the moles will supply more pressure. ✓✓

69.

$$\frac{220 \text{ kPa}}{10^\circ\text{C}} = \frac{P_2}{35^\circ\text{C}}$$

$$P_2 = \frac{(35^\circ\text{C})(220 \text{ kPa})}{10^\circ\text{C}} = \frac{(308 \text{ K})(220 \text{ kPa})}{283 \text{ K}} = 239.434628975 \text{ kPa} \approx 239 \text{ kPa}$$

✓✓✓✓

Please work DOWN the page, not across, using just one equal sign per line. That's proper mathematical form. It will be easier for you to check your work, and much easier for a reader/marker to follow your steps. If we were trying to save paper in a textbook, columns would make sense, but we don't have that restriction here. Thanks.

70.

$$(244 \text{ kPa})(35 \text{ L}) = (1 \text{ atm})V_2$$

$$V_2 = \frac{(244 \text{ kPa})(35 \text{ L})}{1 \text{ atm}} = \frac{(244 \text{ kPa})(35 \text{ L})}{101.3 \text{ kPa}} = 84.3 \text{ L} \approx 84 \text{ L}$$

✓✓✓✓

71.

$$\frac{(235 \text{ kPa})(35 \text{ L})}{n_1(15^\circ\text{C})} = \frac{P_2(36.5 \text{ L})}{n_2(43^\circ\text{C})}$$

And since $n_1 = n_2$,

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$$\frac{(235 \text{ kPa})(35 \text{ L})}{P_2} = \frac{P_2(36.5 \text{ L})}{15^\circ\text{C}} = \frac{P_2(36.5 \text{ L})}{(235 \text{ kPa})(35 \text{ L})\left(\frac{43^\circ\text{C}}{15^\circ\text{C}}\right)} = \frac{(235 \text{ kPa})(35 \text{ L})(316 \text{ K})}{(288 \text{ K})(36.5 \text{ L})} = \frac{2599100 \text{ kPa} \cdot \text{L} \cdot \text{K}}{10512 \text{ L} \cdot \text{K}} = 247.250761035 \text{ kPa} \approx 247 \text{ kPa}$$

Please provide opening statements (e.g. Let x = ...) and statements of conclusion for each answer. Write full sentences. This will make it easier for your marker, but more importantly, it will help you make sure you have answered all parts of the question in the correct order.

✓✓✓✓ Good.

72.

$$P_T = P_N + P_{\text{H}_2\text{O} + \text{CO}_2} + P_O$$

$$P_O = P_T - (P_N + P_{\text{H}_2\text{O} + \text{CO}_2}) = 100 \text{ kPa} - (79 \text{ kPa} + 0.75 \text{ kPa}) = 20.25 \text{ kPa}$$

✓✓

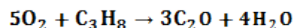
73.

$$\frac{PV}{nT} = R$$

$$n = \frac{PV}{RT} = \frac{(2500 \text{ kPa})(12.0 \text{ L})}{\left(8.31 \frac{\text{kPa} \cdot \text{L}}{\text{mol} \cdot \text{K}}\right)(295 \text{ K})} = \frac{30000 \text{ kPa} \cdot \text{L}}{2451.45 \frac{\text{kPa} \cdot \text{L}}{\text{mol}}} = 12.237655265 \text{ mol} \approx 12.2 \text{ mol}$$

✓✓

74.



$$\frac{PV}{nT} = R$$

$$V = \frac{RnT}{P} = \frac{\left(8.31 \frac{\text{kPa} \cdot \text{L}}{\text{mol} \cdot \text{K}}\right)((3.5 \times 5) \text{ mol})(28^\circ\text{C})}{100 \text{ kPa}} = \frac{\left(8.31 \frac{\text{kPa} \cdot \text{L}}{\text{mol} \cdot \text{K}}\right)(17.5 \text{ mol})(301 \text{ K})}{100 \text{ kPa}} = \frac{43772.925 \text{ kPa} \cdot \text{L}}{100 \text{ kPa}} = 437.72925 \text{ L} \approx 438 \text{ L}$$

Please work DOWN the page, not across, using just one equal sign per line. That's proper mathematical form. It will be easier for you to check your work, and much easier for a reader/marker to follow your steps. If we were trying to save paper in a textbook, columns would make sense, but we don't have that restriction here. Thanks.

75.

$$\frac{PV}{nT} = R$$

$$n = \frac{PV}{RT} = \frac{(100 \text{ kPa})(65 \text{ L})}{\left(8.31 \frac{\text{kPa} \cdot \text{L}}{\text{mol} \cdot \text{K}}\right)(298 \text{ K})} = \frac{6500 \text{ kPa} \cdot \text{L}}{2476.38 \frac{\text{kPa} \cdot \text{L}}{\text{mol}}} = 2.624799102 \text{ mol} \approx 3 \text{ mol}$$

✓✓

76.

$$\frac{PV}{nT} = R$$

$$n = \frac{PV}{RT} = \frac{(100 \text{ kPa})(7.5 \text{ L})}{\left(8.31 \frac{\text{kPa} \cdot \text{L}}{\text{mol} \cdot \text{K}}\right)(298 \text{ K})} = \frac{750 \text{ kPa} \cdot \text{L}}{2476.38 \frac{\text{kPa} \cdot \text{L}}{\text{mol}}} = 0.302861435 \text{ mol} \approx 0.3 \text{ mol}$$

$$m_{\text{He}} = nM = (0.3 \text{ mol})\left(4.0 \frac{\text{g}}{\text{mol}}\right) = 1.2 \text{ g}$$

✓✓✓

77. Molar volume would increase as the temperature increases because the gases would repel each other more. This can be proved from the ideal gas law.

$$\frac{PV}{nT} = R$$

Remove P , n , and R since they are unrelated in this context and,

$$\frac{V}{T} \propto 1 \rightarrow V \propto T$$

As you can see, as T increases, V will also increase as well. This is caused due to the kinetic energy increasing and therefore the volume having to increase to accommodate the increase in energy. To make the quantitative explanation reflect this qualitative explanation, the equation is rewritten as:

$$T \propto V$$

✓✓ Well written.

Works Cited

Ministry of Finance in British Columbia. (n.d.). How the Carbon Tax Works. Retrieved November 11, 2013, from Province of British Columbia:
<http://www.fin.gov.bc.ca/tbs/tp/climate/A4.htm>

Ministry of Finance in British Columbia. (n.d.). What is Carbon Tax? Retrieved November 10, 2013, from Province of British Columbia:
<http://www.fin.gov.bc.ca/tbs/tp/climate/A1.htm>