HOW WELL DO YOU KNOW YOUR COURSE MATERIALS?

These questions (and many others) will be addressed in detail in the TSFX "Unit 3 Exam Revision Lectures" in the Term 3 School Holidays.

UNIT 3 CHEMISTRY

The rate at which ethanol combusts can be reduced by mixing it with dilute sodium hydroxide.

Could you explain why this is the case in the exams?

A student correctly determined that the flashpoint of butane is lower than 25^oC in last year's exam.

How did the student reach this conclusion? What information did he/she use?

The area under the Maxwell-Boltzman curve at different temperatures is the same.

Is this statement correct?

Which one of the following statements about conducting an experiment is the most correct?

A. Precise results may be biased.
B. Accuracy is assured if sensitive instruments are used.
C. A method is valid if it identifies all controlled variables.
D. Repeating a procedure will remove the uncertainty of the results.

The correct answer is A. Could you explain why the other options are incorrect?

Porous electrodes are often used in acidic fuel cells because they provide a surface for the hydrogen and oxygen to directly react together.

This statement is incorrect. What would be a correct answer?

The pH of an acetic acid solution is 5 at 25^oC. What is the pH of the same solution when it is diluted by a factor of 10?

The answer is NOT pH 6. Could you explain why?
Under which circumstances would the pH of an acid increase with a 10 fold dilution?

The rate of reaction increases with increases in temperature. Is this statement correct or incorrect?

This statement is incorrect. Could you explain why?

Equal amounts of ground calcium carbonate are added to an excess amount of HCl. One beaker contains twice the volume of HCl as that present in the other beaker, but both solutions have the same concentration. Would the reaction rates be the same?

The reaction rate in the beaker with the greater volume of HCl will proceed at a faster rate!
Could you explain why?

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All catalysts align the reactant particles in an orientation that is favourable for a reaction to occur. Is this statement correct or incorrect? Give a reason for your answer.

This statement is incorrect.

Enzymes/solid catalysts align (arrange) reactant particles into orientations that favour reaction. However, liquid catalysts and gaseous catalysts do not arrange reactants in this way.

SO_3 **is removed from the below equilibrium mixture at constant volume and temperature. What happens to the rate of the forward reaction as equilibrium is being re-established?**

$$2SO_{2(g)} + O_{2(g)} \rightleftharpoons 2SO_{3(g)} \quad \Delta H = -ve$$

The rate of the forward reaction actually decreases – not increases!
Could you explain why this is the case?

Three metals, X, Y and Z are found to react as follows:

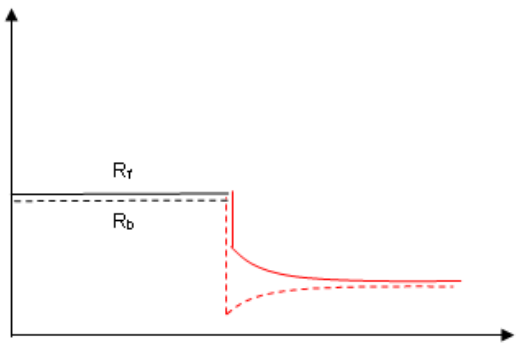
Metal X reacts with $1\,M\ HCl$ but not with $1\,M\ \ Y(NO_3)_2$ solution.
Metal Y reacts with $1\,M\ HCl$.
Metal Z does not react with $1\,M\ HCl$.

Could you correctly state the order in which these species increase in reactivity?

Consider the reaction below:

$$C_{(s)} + H_2O_{(g)} \leftrightarrow CO_{(g)} + H_{2(g)} \quad \Delta H = -91\,kJ/mol$$

What change(s) could account for the rate-time graph illustrated below?



The combustion of methane gas is described by the following reaction:

$$CH_{4(g)} + O_{2(g)} \rightarrow CO_{2(g)} + 2H_2O_{(l)} \quad \Delta H = -890\,kJ/mol$$

If the molar heat of vaporisation of water is $44\,kJ/mol$, calculate the ΔH for the reaction $CH_{4(g)} + O_{2(g)} \rightarrow CO_{2(g)} + 2H_2O_{(g)}$.

The majority of students would provide the following answer: $\Delta H = -890 - 88 = -978\,kJ/mol$
This answer is, however, incorrect. The correct answer is $\Delta H = -890 + 88 = -802\,kJ/mol$.
Why is this the case?

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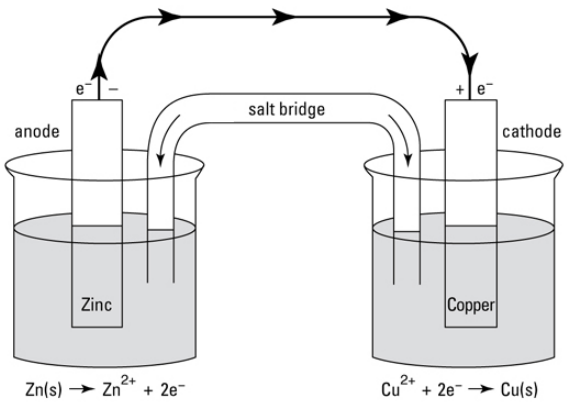
A galvanic cell is to be constructed as follows:



Which of the following electrolytes, KOH $AgNO_3$ and Na_2SO_4 would be most appropriate for the salt bridge. Give a reason for your answer.

What constitutes a good salt bridge electrolyte? Could you think outside the box to come up with an answer to this highly likely exam question?

Energy profiles are not graphs – there is no independent variable (X axis).

Is this statement true or false? Will students be penalised for drawing a horizontal axis on energy profiles?

The heat of combustion of octane is $-5450\ kJmol^{-1}$.

This statement is incorrect. Could you explain why in the exams?

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