Pearson Edexcel

Examiners' Report

Principal Examiner Feedback

January 2020

Pearson Edexcel International GCSE Level

In Chemistry (4CHI1)

Paper 2CR

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Question 1

Part (a)(iii) was generally well answered but some gave a generic definition of a compound and did not refer to the situation in Box 5 as required in the question which showed *two* different elements or types of atoms. Others incorrectly referred to a mixture of atoms or elements.

Question 2

(a) Although well answered by many, some did not gain credit as they did not carefully read the question which asked for changes that should be made. Instead they just stated what was wrong e.g. stating the start line should not be in ink without adding that it should be in pencil. A few incorrectly thought that the water should be level with the start line.
In (b)(i) Most candidates were able to score 1 or 2 mark for giving correct conclusions, but often failed to support these with explanations as required by the question. In (ii) most candidates correctly measured the distance, and then knew how to evaluate the R_f value correctly. However, candidates should be advised to consider how many significant figures are sensible from the data, and although tolerance was shown, those who gave full calculator displays or similar, were penalised. In (iii) the main reason for not gaining the mark was a failure to state the dye was insoluble *in water* or *the solvent*. Some suggested the dye did not move because it was a "single substance".

Question 3

(b) Although it was clearly stated in the question that silver chloride is insoluble, surprising numbers of candidates thought the salt was soluble and described crystallisation methods. Candidates should be advised that stating "wash the solid" is insufficient and that water, preferably deionised or distilled must be mentioned, and also, if using an oven to dry solids, it would be good practise to specify a warm oven. Part (c) proved quite demanding with many not aware of the reason for not using hydrochloric acid in the silver nitrate test for chloride ions. The most common incorrect statement was that hydrochloric acid would not react with the silver nitrate. The calculation in (d) was often correctly answered but it was quite common to see an error involving a factor of ten.

Question 4

(a) This required an explanation of the malleability of metals and produced answers of variable quality. Many answers referred to a variety of things sliding over each other but failed to state that is was either positive ions or atoms. In (b)(i) the inability of solid lead(II) bromide was often incorrectly related to the unavailability of electrons rather than because the ions in a solid are not able to move. In (b)(ii) the completion of the ionic half-equation was often done correctly with the most common errors involving the use of monatomic bromine. The explanation of why lead metal forms at the negative electrode in (b)(iii) tended to be only answered well by the most able candidates. The first mark was often lost for not referring to lead ions and the second mark for failing to explain that the lead ions gain electrons at the negative electrode. However, some did gain this mark by providing a correct ionic half-equation for the formation of lead metal. Part (b)(iv) asking for a suggestion as to why the lamp stays alight when the heating was stopped, proved accessible only to the most able candidates.

Question 5

In (a)(i) candidates were asked for observations, other than bubbling, that could be made when lithium is added to water. Unfortunately, many seemed to confuse lithium with sodium or potassium by suggesting melting, forming a ball, or producing a flame. Many gave alternatives to bubbles such as fizzes or effervesces and obviously did not gain credit. As expected, the test for hydrogen in (a)(ii) was well known although some did not gain the mark as they used a glowing splint, whilst others missed out the need for a flame or lighted splint and just stated the "pop test". Most gained the mark in (b)(i) by referring to potassium producing a flame. The required explanation for why potassium is more reactive than lithium in (b)(ii) proved to be a good discriminator. Many stated that a potassium atom is larger or has more shells than a lithium atom and so gained the first mark, but imprecise language or incomplete explanations then often caused a failure to gain more credit. Many failed to explain in terms of the outer shell electron or did not give comparisons between lithium and potassium in their answers. In the volume of gas calculation in (c)(i) many fully correct answers were given. However, some failed to use the ratio from the equation, whilst others did not take into account that they were asked, for the only time in the paper, to do their calculation to a specific number of significant figures. In these circumstances it is not suitable to do working to a smaller number of significant figures. The titration calculation in (c)(ii) was well attempted by many candidates but some did not use the mole ratio from equation correctly.

Question 6

(a) Some found ordering the sequencing of the stages difficult and many candidates just wrote down all they knew about crude oil without organising their answer. This often included confusing fractional distillation with cracking. However, many scored at least two of the four marks. The most common misapprehension was the belief that fractional distillation produces separate compounds all with a different boiling point, rather than appreciating that fractions containing a mixture of compounds or hydrocarbons having similar boiling points or similar range of boiling points are produced. In (b)(i) only a small proportion gained both marks. Many made incorrect references to particles gaining energy or speed as a result of the increased pressure. Many failed to gain the second mark as they did not refer to the increased frequency of (successful) collisions. 6(b)(ii) was often well answered with only a minority of candidates scoring no marks. This usually happened when the candidate simply stated that a catalyst increased the reaction rate without itself taking part or changing, with no reference to activation energy in their answer. The majority correctly referred to increasing the temperature in (iii). In (b)(iv) a wide variety of reaction profile diagrams were seen including a few showing endothermic reactions. Candidates should be careful to ensure that arrows indicating enthalpy change and activation energy start and end at the correct position. Many knew how to use bond energies to carry out the calculation in (c) and a good proportion scored all three marks as a result. A few lost a mark as after having correctly calculated the numerical answer they failed to include the required minus sign.

Question 7

In (a)(ii) Most of the acceptable alternatives were seen on a regular basis with references to the need for anaerobic conditions being required for the fermentation/respiration a common answer. In (iii) many correctly referred to the enzymes in yeast being denatured above 40°C whilst some weaker candidates stated glucose or ethanol would be destroyed. In (iv) a high proportion of candidates scored full marks with both alternative methods used for showing the percentage yield is 15%. A few candidates

unsuccessfully tried to justify the 15% with a variety of incorrect calculations. In (b)(i) strong candidates gave two correct features of a reaction in dynamic equilibrium. The most common error was to state the concentration of reactants equals the concentration of products. Part (b)(ii) was another opportunity for the more able candidates to show their knowledge and understanding. Candidates are reminded that answers just invoking Le Chatelier's Principle will not attract credit. In (c)(i) many were able to give at least one correct displayed formula, usually the alcohol. Displayed formulae must show all atoms and bonds including the O-H bond. In part (ii) candidates were asked to give a chemical test for a carboxylic acid other than using an indicator. Despite this instruction, a significant number of candidates proceeded to offer the use of an indicator. Only a minority gained both marks, invariably because they failed to refer to a named carbonate, metal or alcohol. There were also a surprising number of candidates who suggested using bromine water.

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