**TITRATIONS LAB QUIZ**

**CHEMISTRY 12**

1(a) Before it can be used to deliver solution to the conical flask, a pipette should first be rinsed with that solution. Explain why. [2]

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(b) In the titrations done in class what should the following items be rinsed with before they are used. [3]

(i) volumetric flask ………………………………………….

(ii) conical flask ………………………………………….

(iii) plastic storage bottle ………………………………………….

2. The table below shows the measurements taken for a number of titrations.

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| --- | --- | --- | --- | --- | --- |
| Final volume (mL) | 23.65 | 43.80 | 20.25 | 39.45 | 21.90 |
| Initial volume (mL) | 3.40 | 24.65 | 1.05 | 20.25 | 2.15 |
| Volume added (mL) |  |  |  |  |  |

(a) Complete the table. [1]

(b) Calculate the average titration volume (to two decimal places) for this experiment. [1]

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(c) Did you use all five values to calculate the average? Explain why or why not. [1]

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3. When hydrochloric acid is titrated with sodium carbonate solution, what will be the approximate pH at the equivalence point? The equation for this reaction is

HCl (aq) + Na2CO3 (aq) 🡪 2NaCl (aq) + CO2 (aq) + H2O (l) [1]

(a) ……………………………………………………………………..……………………………

(b) Write the balanced chemical equation that explains this. [1]

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4. Why must an indicator be used in acid-base titrations? [1]

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5 (a) List two properties of primary standards. [2]

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(b) Students in Mr Cornish's class broke all the 250 mL volumetric flasks. Now everyone else needs to use the 100 mL volumetric flasks to make their 0.05 mol L-1 sodium carbonate solutions. Calculate how much anhydrous sodium carbonate is required to make 100.00mL of standard solution. [2]

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(c) Both sodium carbonate and sodium hydroxide are bases yet only sodium carbonate is a primary standard. Explain why. [2]

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(d) A student is preparing a standard solution using a 250 mL volumetric flask but used too much distilled water and overshot the mark by about one centimetre. The student carefully tipped out some solution before ***carefully*** making the solution up to the mark. Explain what is wrong with this approach and say what the student should have done. [2]

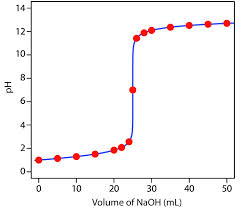
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6. The graph below shows the change in pH as a solution of hydrochloric acid is titrated with sodium hydroxide solution.



phenophthalein

Q

methyl orange

litmus

(a) The colour change ranges for the 3 indicators methyl orange, litmus and phenolphthalein are shown on the graph.

State which indicator is the best to use for this titration. ………………………… [1]

(b) Explain why you choose your answer to the question above. [3]

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(c) Complete the table below of the titration mixture at point 'Q' had been separately trialled with each of the three indicators then what colour would be observed? [3]

|  |  |
| --- | --- |
| Indicator present | Colour at Q. |
| methyl orange |  |
| litmus |  |
| phenolphthalein |  |

7. A group of students, while titrating HCl with Na2CO3, incorrectly decided to use phenolphthalein as their indicator because they felt the colour change was easier to work with.

(a) How will their sodium carbonate titres compare to those they would get if they had used methyl orange? Explain. [2]

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(b) What implications will this have for the concentration of HCl arrived at as a result of their titrations? [2]

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8. 5.00 cm3 of concentrated sulfuric acid were pipetted into a 1.00 L volumetric flask and the solution made up to volume. Three 20.00mL samples of 0.207 M NaOH required 22.20, 22.15 and 22.65 cm3 of this diluted acid solution for neutralization using methyl red indicator.

(a) Write the equation for this reaction. [1]

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(b) Calculate the average number of moles of sodium hydroxide reacted in the titrations. [2]

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(c) Calculate the concentration of the diluted sulphuric acid solution. [3]

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(d) Calculate the concentration of the original concentrated sulphuric acid. [2]

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