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Teaching Chemistry through Riddles

Introduction

Teaching science in general and chemistry in particular in classrooms is a dull and uninteresting experience for students who lack passion for the subject. Too many facts in the form of reactions, properties, preparation, uses, etc. are presented which make it difficult for the student to grasp and assimilate the right perspective. Over a period of time the teacher also loses interest and enthusiasm, leading to monotony in teaching. Under these circumstances, attracting the attention of the students and engaging their minds needs innovative teaching methods. Any novel approach in classroom teaching, even if its impact is marginal, is to be welcomed.

Mala Das Sharma[1] has been experimenting on teaching chemistry through riddles based on chemical principles and facts. She reports that she has conducted a number of programmes at colleges (as intercollegiate contests) in Hyderabad and Secunderabad, with a high degree of success in enthusing the students to learn chemistry. A short film has now been made with Mala Das Sharma conducting such a programme by Audio Visual Research Centre at Osmania University, Hyderabad, and will be telecast on the national network.

This method may interest chemistry teachers in schools and colleges and they may adopt it in their teaching programmes. Five of the riddles sent by her are given below as examples based on which teachers may formulate more such riddles on their own.

The answers to these riddles are not discussed here. Interested students may work them out. For any further information, Mala Das Sharma may be contacted.

Editors

Example 1

The fact that Fe(III) is more stable than Fe(II) and the concept of salt hydrolysis can be introduced by this riddle.

I am light green in colour, but turn deep brown when exposed to air. If conc. H_2SO_4 is added carefully when I am in the company of an aqueous solution of a nitrate in a test tube, I form a brown coloured ring. I dissolve in water only if a little acid is present, otherwise I cause turbidity.

a) Who am I?

b) Why do I turn brown in air?

c) What have I been converted into in the brown ring?

d) Why do I not form a clear solution in water alone, but need an acid?

Example 2

With the help of the following riddle, reactions of aldehydes in general and of acetaldehyde in particular can be discussed.

I form a mirror on interacting with ammoniacal silver nitrate, and a brick coloured precipitate with a mixture of solutions of sodium potassium tartarate and copper sulphate (called Fehling's solution). With iodine and alkali I produce yellow iodoform crystals.

a) Who am I?

b) How is the mirror formed?

c) Why is brick-red precipitate deposited?

d) How do I give you iodoform?

Example 3

This riddle can be used to discuss the principle of solubility product and common ion effect and their importance in solubility and precipitation.

I am a silvery white metal. I produce vigorous effervescence with acid. I pair with sulphide of hydrogen sulphide gas in alkaline medium, but not in acid medium.

a) Who am I?

b) What is the effervescence due to?

c) What compound is formed with hydrogen sulphide?

d) Why does the alkaline medium promote my reaction with hydrogen sulphide, but the acid medium hinders?

Example 4

The following riddle can be one way of making the Grignard reaction interesting in teaching its synthetic importance.

Mr G and the members of his family are proficient in making alcohols larger than themselves by combining with other families of compounds. They are also good in preparing several other types of compounds. While doing so, they seek and form strong bonds with the positive site of the reactants functional group.

a) Name Mr Gs family.

b) What are the other families with which Gs form alcohols?

c) Why do Gs seek positive site while combining with others?

d) How can Gs form alkanes or other hydrocarbons?

Example 5

X is a bright, purple coloured substance. It pulls off electrons very efficiently. It can simulate sunrise in the laboratory in association with oxalic acid. It readily loses colour, but does not transfer it, in the company of alkenes, alcohols, aldehydes and several others.

a) What is X?

b) Why is it an effective electron-puller?

c) What does it do in association with oxalic acid? (Write the equation.)

d) Why is its colour lost with alkenes, etc? (Write equations.)