CHAPTER-4

ANALYSIS AND INTERPRETATION

Thermodynamics, Equilibrium in chemical reactions, Redox reactions and *Oxidation number.*
The sample size of the study was of 38 students.

For this purpose, the researcher has concised the complete data in a table. In which there will be topic wise percentage data of students who think any particular topic to be easy or difficult.

Table 4.1

Topic wise percentage data of students' perception for easiness and difficulty

Sr. No.	Targeted Concept	Students' perception about topics	
		Easy (%)	Difficult (%)
1.	Mole Concept	71	29
2.	Atomic models	47	53
3.	Periodic classification	71	29
4.	Bonding theories	71	29
5.	Hybridisation	66	34
6.	The gaseous state	45	55
7.	Spontaneity in Thermodynamics	39	61
8.	Equilibrium in chemical reactions	47	53
9.	Redox reactions	63	37
10.	Oxidation number	82	18

From above table no.4.1, it is evident that -

1. The Mole concept was easy for 71% of the students
2. The Atomic models was difficult for 53% of the students.
3. Periodic classification was easy for 71% of the students.

4. Bonding theories was easy for 71% of the students.

5. Hybridisation was easy for 66% of the students.

6. The gaseous state was difficult for 55% of the students.

7. Spontaneity in Thermodynamics was difficult for 61% of the students.

8. Equilibrium in chemical reactions was difficult for 53% of the students.

9. Redox reactions was easy for 63% of the students.

10. The oxidation number was easy for 82% of the students.

Conclusion: 1. Mole concept, Periodic classification, Bonding theories, Hybridisation, Redox reactions and the Oxidation number concepts were found to be easy for most of the students.

2. The Atomic models, the Gaseous state, Spontaneity in Thermodynamics and Equilibrium in chemical reactions concepts were found to be difficult for most of the students.

4.3.2. Objective 2: To find out the reason/reasons for any concept to be easy or difficult for students

In the questionnaire form the students were provided with 3 reasons to select for any concept to be easy or difficult, the students had the liberty to take more than one reason for any topic. The reasons for any topic to be easy were '*I like Chemistry*', '*I understand this topic well*' and '*I take coaching for Chemistry*' whereas the reasons for any topic to be difficult were '*I dislike Chemistry*', '*I don't understand this topic well*' and '*I don't take coaching for Chemistry*'.

For this purpose, the researcher has presented the topic wise data in the table. In which there is percentage data of students for different reasons they think any particular topic to be easy or difficult.

Mole concept: From table no. 4.1, it is evident that the Mole concept was an easy topic for most of the students. Therefore the researcher has tried here to find out the reason for that.

Table 4.2

Reasons for which the Mole concept was easy

S. No.	Reasons for being easy	Students' count who selected the reason
1.	I like Chemistry	11 (29%)
2.	I understand this topic well	**27 (71%)**
3.	I take coaching for Chemistry	13 (34%)

From above table no.4.2, it is evident that the main reason for the mole concept to be an easy concept for students is that they understand this topic well.

Atomic models: From table no. 4.1, it is evident that the Atomic models was a difficult topic for most of the students. Therefore the researcher has tried here to find out the reason for that.

Table 4.3

Reasons for which the Atomic model was difficult

S. No.	Reasons for being difficult	Students' count who selected the reason
1.	I dislike Chemistry	1 (2.6%)
2.	I don't understand this topic well	**19 (50%)**
3.	I don't take coaching for Chemistry	5 (13%)

From above table no.4.3, it is evident that the main reason for Atomic models to be a difficult concept for students is that they don't understand this topic well.

Periodic classification: From table no. 4.1, it is evident that the Periodic classification was an easy topic for most of the students. Therefore the researcher has tried here to find out the reason for that.

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Table 4.4

Reasons for which the Periodic classification was easy

S. No.	Reasons for being easy	Students' count who selected the reason
1.	I like Chemistry	15 (39%)
2.	I understand this topic well	**27 (71%)**
3.	I take coaching for Chemistry	16 (42%)

From above table no.4.4, it is evident that the main reason for Periodic classification to be an easy concept for students is that they understand this topic well.

Bonding theories: From table no. 4.1, it is evident that the Bonding theories was an easy topic for most of the students. Therefore the researcher has tried here to find out the reason for that.

Table 4.5

Reasons for which the Bonding theories was easy

S. No.	Reasons for being easy	Students' count who selected the reason
1.	I like Chemistry	16 (42%)
2.	I understand this topic well	**27 (71%)**
3.	I take coaching for Chemistry	18 (47%)

From above table no.4.5, it is evident that the main reason for Bonding theories to be an easy concept for students is that they understand this topic well.

Hybridisation: From table no. 4.1, it is evident that Hybridisation was an easy topic for most of the students. Therefore the researcher has tried here to find out the reason for that.

Table 4.6

Reasons for which the Hybridisation was easy

S. No.	Reasons for being easy	Students' count who selected the reason
1.	I like Chemistry	13 (34%)
2.	I understand this topic well	**25 (66%)**
3.	I take coaching for Chemistry	14 (37%)

From above table no.4.6, it is evident that the main reason for Hybridisation to be an easy concept for students is that they understand this topic well.

The gaseous state: From table no. 4.1, it is evident that the gaseous state was a difficult topic for most of the students. Therefore the researcher has tried here to find out the reason for that.

Table 4.7

Reasons for which The gaseous state was difficult

S. No.	Reasons for being difficult	Students' count who selected the reason
1.	I dislike Chemistry	1 (2.6%)
2.	I don't understand this topic well	**20 (53%)**
3.	I don't take coaching for Chemistry	8 (21%)

From above table no.4.7, it is evident that the main reason for The gaseous state to be a difficult concept for students is that they don't understand this topic well.

Spontaneity in Thermodynamics: From table no. 4.1, it is evident that Spontaneity in Thermodynamics was a difficult topic for most of the students. Therefore the researcher has tried here to find out the reason for that.

Table 4.8

Reasons for which The Spontaneity in Thermodynamics was difficult

S. No.	Reasons for being difficult	Students' count who selected the reason
1.	I dislike Chemistry	1 (2.6%)
2.	I don't understand this topic well	**22 (58%)**
3.	I don't take coaching for Chemistry	9 (24%)

From above table no.4.8, it is evident that the main reason for Spontaneity in Thermodynamics to be a difficult concept for students is that they don't understand this topic well.

Equilibrium in chemical reactions: From table no. 4.1, it is evident that Equilibrium in chemical reactions was a difficult topic for most of the students. Therefore the researcher has tried here to find out the reason for that.

Table 4.9

Reasons for which The Equilibrium in chemical reactions was difficult

S. No.	Reasons for being difficult	Students' count who selected the reason
1.	I dislike Chemistry	1 (2.6%)
2.	I don't understand this topic well	**19 (50%)**
3.	I don't take coaching for Chemistry	7 (18%)

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From above table no.4.9, it is evident that the main reason for Equilibrium in chemical reactions to be a difficult concept for students is that they don't understand this topic well.

Redox reactions: From table no. 4.1, it is evident that the Redox reactions was an easy topic for most of the students. Therefore the researcher has tried here to find out the reason for that.

Table 4.10

Reasons for which the Redox reactions was easy

S. No.	Reasons for being easy	Students' count who selected the reason
1.	I like Chemistry	10 (26%)
2.	I understand this topic well	**24 (63%)**
3.	I take coaching for Chemistry	14 (37%)

From above table no.4.10, it is evident that the main reason for Redox reactions to be an easy concept for students is that they understand this topic well.

Oxidation number: From table no. 4.1, it is evident that Oxidation number was an easy topic for most of the students. Therefore the researcher has tried here to find out the reason for that.

Table 4.11

Reasons for which the Oxidation number was easy

S. No.	Reasons for being easy	Students' count who selected the reason
1.	I like Chemistry	11 (29%)
2.	I understand this topic well	**31 (82%)**
3.	I take coaching for Chemistry	19 (50%)

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From above table no.4.11, it is evident that the main reason for Oxidation number to be an easy concept for students is that they understand this topic well.

Conclusion: From analysis of the data available in the table 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9, 4.10 and 4.11. The researcher has concluded that-

1. The main reason for any topic to be easy for the students was that they understood the topic well with other less found reasons like they took coaching for Chemistry and they liked Chemistry.

2. The main reason for any topic to be difficult for the students was that they did not understand the topic well with other less found reasons like they did not take coaching for Chemistry and they did not like Chemistry.

4.3.3. Objective 3: To find out the achievement of XI standard students in different targeted concepts of Chemistry.

The topics which have been selected for the study were *Mole concept, Atomic models, Periodic classification, Bonding theories, Hybridisation, The gaseous state, Spontaneity in Thermodynamics, Equilibrium in chemical reactions, Redox reactions* and *Oxidation number.* On the basis of these 10 targeted concepts there are 12 standardized SCQ type questions that have been given to the students for the achievement test which means One or Two questions per topic has been given. The researcher will do the topic wise percentage analysis.

For this purpose, the researcher has concised the complete topic wise data of questions along with the percentage data of the students who have given the correct answers to the following questions in a table.

Table 4.12

Topic wise percentage data of students who gave correct answers to the questions of the following topics

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Sr. No.	Targeted Concept	Students who gave correct answers to the questions	
		Number of students	(%) of students
1.	Mole Concept	20	52.6
2.	Atomic models	26	68.4
3.	Periodic classification	21	55.3
4.	Bonding theories	22	57.9
5.	Hybridisation	22	57.9
6.	The gaseous state	19	50
7.	The gaseous state	17	44.7
8.	Spontaneity in Thermodynamics	17	44.7
9.	Equilibrium in chemical reactions	21	55.2
10.	Equilibrium in chemical reactions	17	44.7
11.	Redox reactions	22	57.9
12.	Oxidation number	27	71

From the above table no. 4.12, it is evident that-

1. 52.6% of the students have given the correct answer to the Mole concept question.
2. 68.4% of the students have given the correct answer to the Atomic models question.
3. 55.3% of the students have given the correct answer to the Periodic classification question.
4. 57.9% of the students have given the correct answer to the Bonding theories question.
5. 57.9% of the students have given the correct answer to the Hybridisation question.

6. There were 2 questions from Gaseous state, in which 50% and 44.7% of the students respectively gave the correct answer. Therefore the average of the students who have given the correct answer to gaseous state questions is 47.35.

7. 44.7% of the students have given the correct answer to Spontaneity in Thermodynamics question.

8. There were 2 questions from Equilibrium in chemical reactions, in which 55.2% and 44.7% of the students respectively gave the correct answer. Therefore the average of the students who have given correct answer to Equilibrium in chemical reactions is 49.95%.

9. 57.9% of the students have given the correct answer to the Redox reactions question.

10. 71% of the students have given the correct answer to the Oxidation number question.

Conclusion: 1. Most of the students have given the correct answers to the questions of Mole concept, Atomic models, Periodic classification, Bonding theories, Hybridisation, Redox reactions and the Oxidation number concepts.

2. Most of the students could not give correct answers to the questions of the Gaseous state, Spontaneity in Thermodynamics and Equilibrium in chemical reactions concepts.

Other findings: Following conclusions are drawn from the analysis of objective no.1 and objective no.3-

1. The Mole concept was easy for 71% of the students however it is not clearly evident as 52.6% students could give the correct answer to the question from this topic.

2. Atomic theories was difficult for 53% (i.e. easy for 47%) of the students however it is not evident as 68.4% students could give the correct answer to the question from this topic.

3. Periodic classification was easy for 71% of the students however it is not clearly evident as 55.3% students could give the correct answer to the question from this topic.

4. Bonding theories was easy for 71% of the students however it is not clearly evident as 57.9% students could give the correct answer to the question from this topic.

5. Hybridisation was easy for 66% of the students and it is also evident as 57.9% students could give the correct answer to the question from this topic.

6. The Gaseous state was difficult for 55% (i.e. easy for 45%) of the students and it is also clearly evident as 47.35% students could give the correct answer to the question from this

topic.

7. Spontaneity in Thermodynamics was difficult for 61% (i.e. easy for 39%) of the students and it is also evident as 44.7% students could give the correct answer to the question from this topic.

8. Equilibrium in chemical reactions was difficult for 53% (i.e. easy for 47%) of the students and it is also evident as 49.95% students could give the correct answer to the question from this topic.

9. Redox reactions was easy for 63% of the students and it is also clearly evident as 57.9% students could give the correct answer to the question from this topic.

10. The Oxidation number was easy for 71% of the students and it is also evident as 82% students could give the correct answer to the question from this topic.