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Puzzle Game for Learning Chemistry

Mr. D.D. Shinde, Mr. M.D. Walekar
Science and Humanities, Y. B. Polytechnic, Maharashtra, India

Abstract- In this paper we are going to explain the design of puzzle game based on chemistry. In this design of the game includes teaching of basic concepts of chemistry which are related to covalent bonds. The concepts of teaching chemistry to college students or young learners are not developed as of now but for small age students we can use this puzzle for understanding chemistry concepts. Basically these games are combination of fun and education using atoms and molecule. In this paper we are going to focus on the features of chemistry objects which we are going to include in our game. At the time of teaching the basic concept of Chemistry, for example bonds between atoms and how molecules are generated teacher normally gives examples to define the formation of bonds. Hence, the concepts of molecules and atoms are difficult to understand and imagine for the students. So this game Atoms and Molecule i.e. A2M will help to understand the formation of bonds.

Keywords- Game Based Learning, Chemistry, Puzzle, Game Design.

I. INTRODUCTION

Now a day's designing a GAME is very popular. Online software games are very popular for children as well as teenagers. For entertaining purpose student can use this type of games but after some level are not consider for learning purpose even though those are easily grasping way for the students. Mostly students are playing games just for fun and in this case t is very difficult to make mixer or combination of fun and education at one page.

In the Computer games there are so many interesting things and activities which we an use for motivation of the student and learn with interest and actively.

In our country in generally time period of class are around 45 minutes to 1 hour so we need to design and develop short and simple games which can interesting are student can learn by playing those games.

Currently there are some educational games are present and using for learning purpose but those are Very complex and time taking process are there so again it is becoming very boring. There is still gap in Research of in Educational technology on environment of game design which can be use for aster knowledge transfer, problem solving methods, detail understanding of concepts with combination of entertain and fun activities.

So in this paper we are trying to explain how we can apply the game-based learning approach to guide students in observing and understanding the relation of atoms to form molecules. To understand the concepts through the fun, This A2M game will play very important role and it will be very interesting and acceptable for students.

As per our survey, there are some practitioners are using puzzle games as tool for teaching. And the result of educational puzzle games is most acceptable for students to understand the concepts with real time examples.

In this paper we are going to cover following:

- First we will explain Description of game.

- Second we will cover details of the different objects used in the game.
- Third, we will explain different level designs which are used in the game scoring of patterns.

II. GAME DESCRIPTION

A2M i.e. Atoms to Molecule is a puzzle game of single player in this game player can play in chemistry lab. There are different levels in the game and those levels consist of lab equipments and atoms.

The levels start with the atoms starting from the top of the screen. The constant will be the total number of atoms in that particular level and type of items will generate randomly and automatically. The Puzzle game player will drag and drop the atoms to make bonds using nearest atoms. Player will change the atom position easily by connecting atoms to molecules. This molecules will get invisible and then randomly generated atom will replaced by used atoms.

A player can create molecule by connecting different types of atoms. The control or charge of a player is to create molecules and solve different types of puzzles of lab of Chemistry. Player can rearrange atoms to make small or big molecules in shape of ring, linear.

The main goal in each level is to create different type of molecules with different objectives. At this level we are using atoms as role of puzzle to for creating molecule to solve puzzle. At the timing of solving this type of puzzles students can learn how to make module from atoms using different bonds like single bond, double bond, triple bond etc.

1. Basic Game Modes

Atoms

Atom is main character in our puzzle game. For young learner we can develop look of atom is attractive. The body colour and symbol which is on head will represent the type of element.

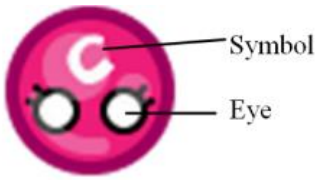

Figure 1: Details of Carbon Atom

Table 1 This is chart of Atom Details

Element	Symbol	Color	Total no.of Bonds
Hydrogen	H	Blue	One
Oxygen	O	Orange	Two
Nitrogen	N	Violet	Three
Carbon	C	Red	Four
ElementX	X	Black	Variable with max of three

For the total number of bongs and possible making atoms we can assign Gender. The main purpose of assigning gender is to categorize odd and even number of bonds. As shown in below table.

Table 2: ATOM Eye State Chart

State	Girl/Boy Look	Result
Normal		Free State Atom
Open		Atom bonded with another Atom but not Satisfied
Cross		contact with some enemy causing it to break all its bond
Happy		Bonds of the atom are satisfied but automatically changes to sleep after some times
Sleep		All the bonds of the atoms are satisfied

If we take example of Hydrogen, we have assigned boy for odd number of atom bonds and if we take example of Oxygen, we have assigned boy for even number of atom bonds. Due to these children can easily distinguish between odd even and it will serve as an education and entertainment purpose.

Bond

Bonds may be Single, Double or Triple after dragging and dropping near an atom.

Atom will try to make huge number of bonds.

Bond Angle

When Atom newly connects with another atom it will define angle. There may be different angles like 0, 120, 240, 60, 180 and 300 degrees. The angles use for maintaining the distance so that no two or more atoms are close to each other.

2. Game Modes:

Adventure

Adventure Mode is the starting or initial mode, and it gives an opportunity to a player to learn how to make molecules and then how to go for to the expert levels.

Lab Setup

Lab setup is divided in two modes:

- Equipment mode
- Atomic Mode

In lab setup there is Equipment mode. In this mode player can add, rotate, move and clamp lab equipments inside the lab area. The equipments are under physics simulation in this mode, but the atoms are not simulated and are kept transparent, i.e. no crashes take place in between the atoms. Lab Equipments which are provided can be

- Electrodes
- Thermometer
- PH scale
- Funnel
- Test tube
- Conical flask
- Measuring cylinder
- Beaker
- Clipboard

Atomic Mode

In this mode a player can add or remove atoms in the Lab area. Molecules can be created using the other connected atoms. The types of randomly generated and merged. But the created molecules cannot be removed automatically in this mode like Adventure mode. In this mode equipments are static and atoms are under physics simulation.

III. CONCLUSION

In this paper we tried to explain the basic design of A2M puzzle game and how it is covering with the basic concepts of covalent bonding. We have elaborate type of bonds and how it can for as well as we have covered details of different levels We are hoping to add more interesting Chemistry concepts in our puzzle game.

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