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Designing Of Lectures through Systemic Approach to Teaching and Learning, a Model for (SATL) Methodology

*M. Nazir and I. I. Naqvi
*Department of Chemistry, University of Karachi, Karachi-75270, Pakistan.
National Core Group in Chemistry, H.E.J Research Institute of Chemistry,
University of Karachi, Karachi-75270, Pakistan
E-mail:*nazir_misbah@yahoo.com

ABSTRACT
Concepts play a vital role in enabling chemist to deliver. The recently developing concept based teaching methods are likely to play a pivotal role towards the efforts for promoting understanding of chemical concepts and assimilation of vital theoretical foundations of chemistry. A. F. M. Fahmy and J. J. Lagowski are the leading figures in a worldwide derive towards concept building of young generation through this novel mode of teaching and learning. However, their efforts, till recently have been mostly organic chemistry specific. Nevertheless, SALTC teaching methods are equally applicable to various other disciplines in chemistry. SATLC methodology can also be thus used to overcome the problems faced by students in understanding the efficacy of any chemical entity for a specific and desired chemical action. This presentation outlines possible applications of SATLC technique to the concepts related to a number of aspects of Physical Chemistry that are to be put together in one unit for facilitating a chemical compound's application in any chemical change desired by any researcher.

Keywords: Chemical Specie, Systemic Approach, Chemistry Learning

1. INTRODUCTION
Teaching is the most demanding profession. It is the duty of a teacher to deliver the basics of the subject. There are numerous strategies, through which teaching and learning of scientific subjects, in general, and chemistry in particular may be made much easier to understand. Various teaching options continue to be reported in literature to illustrate the basics of chemistry in order to enhance its teaching and learning[1-8]. Ping Y. Furlan et al. express chemistry concepts by poetry writing, poster illustration and group presentations. Concept mapping is one of the ways to summarize the connections of the subject. Boyd L. Earl has given the concept map of quantitative chemical relationships and structure and properties for general chemical courses. In the past decade an innovative way of teaching and learning through systemic approach (SATL) has been introduced[9-12] for this end.

In Systemic Approach in Teaching and Learning Chemistry (SATLC) technique the ideas are arranged in such a way that the interaction between a range of concepts and issues are made understandable. In various publications it has been stated that systemic approach to teaching and learning (SATL) for discussing any issue initiates with the systemic diagram (SD0), which is based on the previous knowledge of students[12]. After inclusion of similar systemics with known and unknown relationships (SD1, SD2, SD3 and so on) the unit ends at final systemic diagram (SDf). In (SDf) all the relationships between different concepts of the unit have been delivered to the students.(Fig-1)

Several systemic diagrams on a variety of topics can be developed and finally all of these may be assembled together (Fig-2).

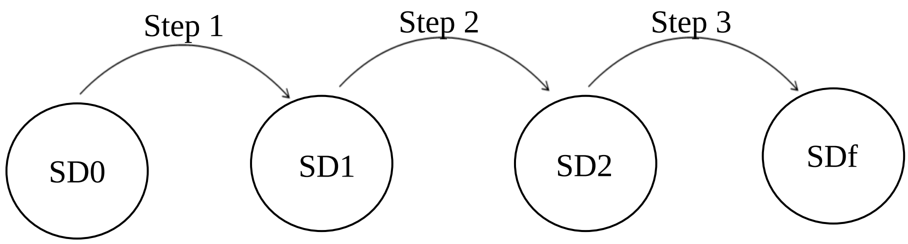

Fig-1: Systemic approach stratagem

Physical properties of a substance are of vital importance while these are chosen for any chemical application in improving quality of life on this planet. These applications may be industrial, cosmetic or concerning pollution abating properties, a few to refer to here. Hence it is highly advisable that the users are in a position to comprehend the inter relationships concerning the physical properties of these chemical entities. We find SATL methodology an appropriate means to deliver in this context .In the following description a model lecture encompassing discussion connected to a number of physical properties of a chemical substance is being brought into focus.

*Corresponding Author
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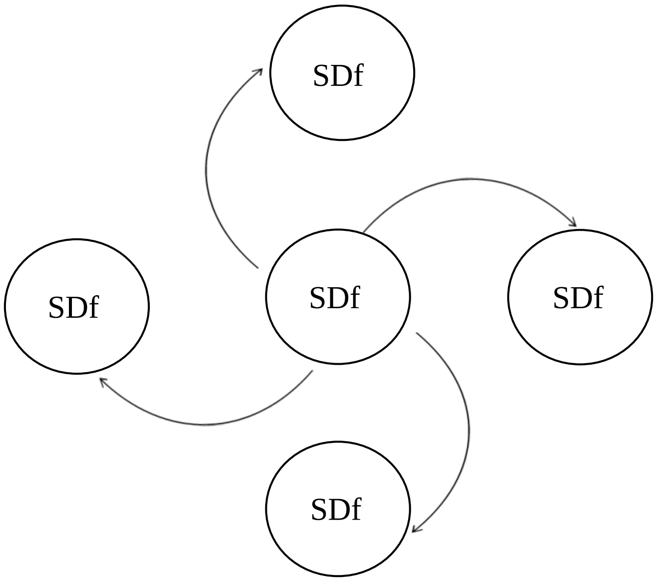

Fig-2: Association of final systemic diagrams (SDf) on various topics.

2. METHODOLOGY

When we look for the suitability of any chemical entity for a particular usage in the direction of a chemical process being undertaken, it is always advisable to look into its physical and chemical properties in a single package. This package has got to encompass all the doable and otherwise restrictions regarding the sustainability and the safety of the chemical processes involved. Therefore here "A chemical species" is taken into focus to demonstrate the efficacy of SATLC towards this pursuit. Mostly linear approach is used to address this question. In this draft the linear approach towards this topic will be transformed into systemic approach.

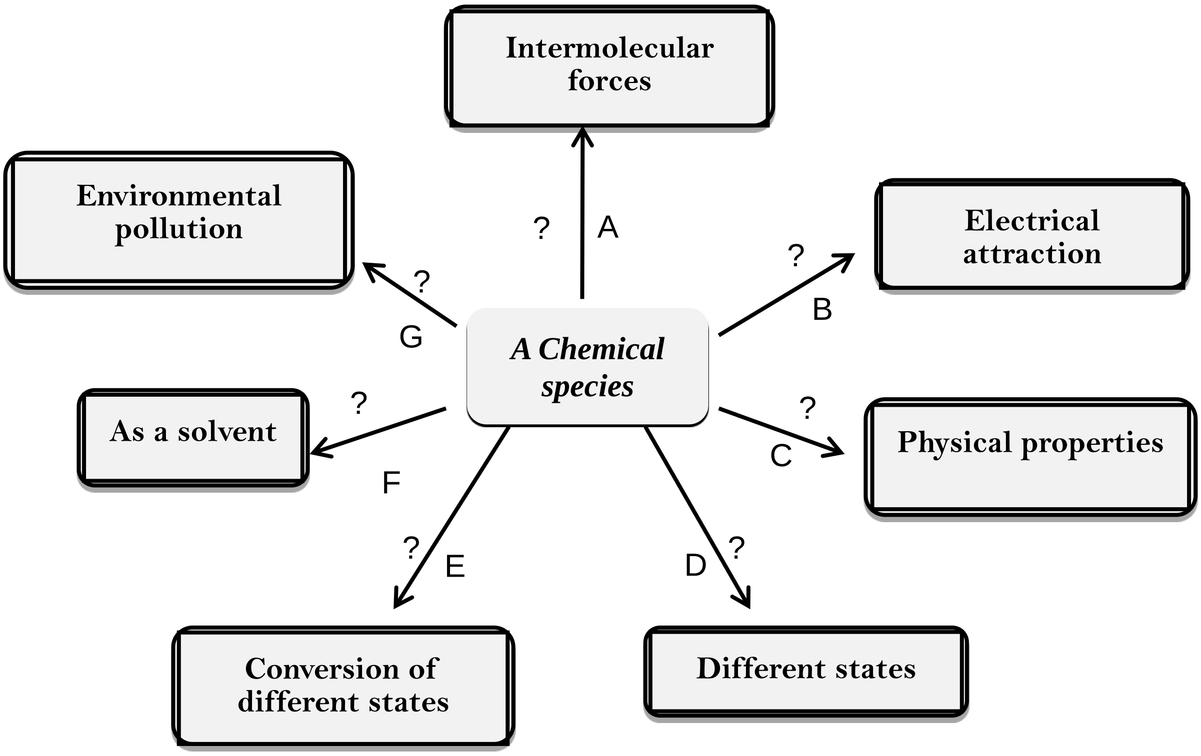

Fig-3: Linear relations between some of the properties of a chemical species.

Fig-3 is based upon a score of linear relationships among various properties of any chemical species. The relationships (A-G) in Fig-3 are represented as a sequence of linear associations which are related to a chemical compound. Figure 3 can now be transformed into the systemic diagram (SD0) as shown in Fig-4.

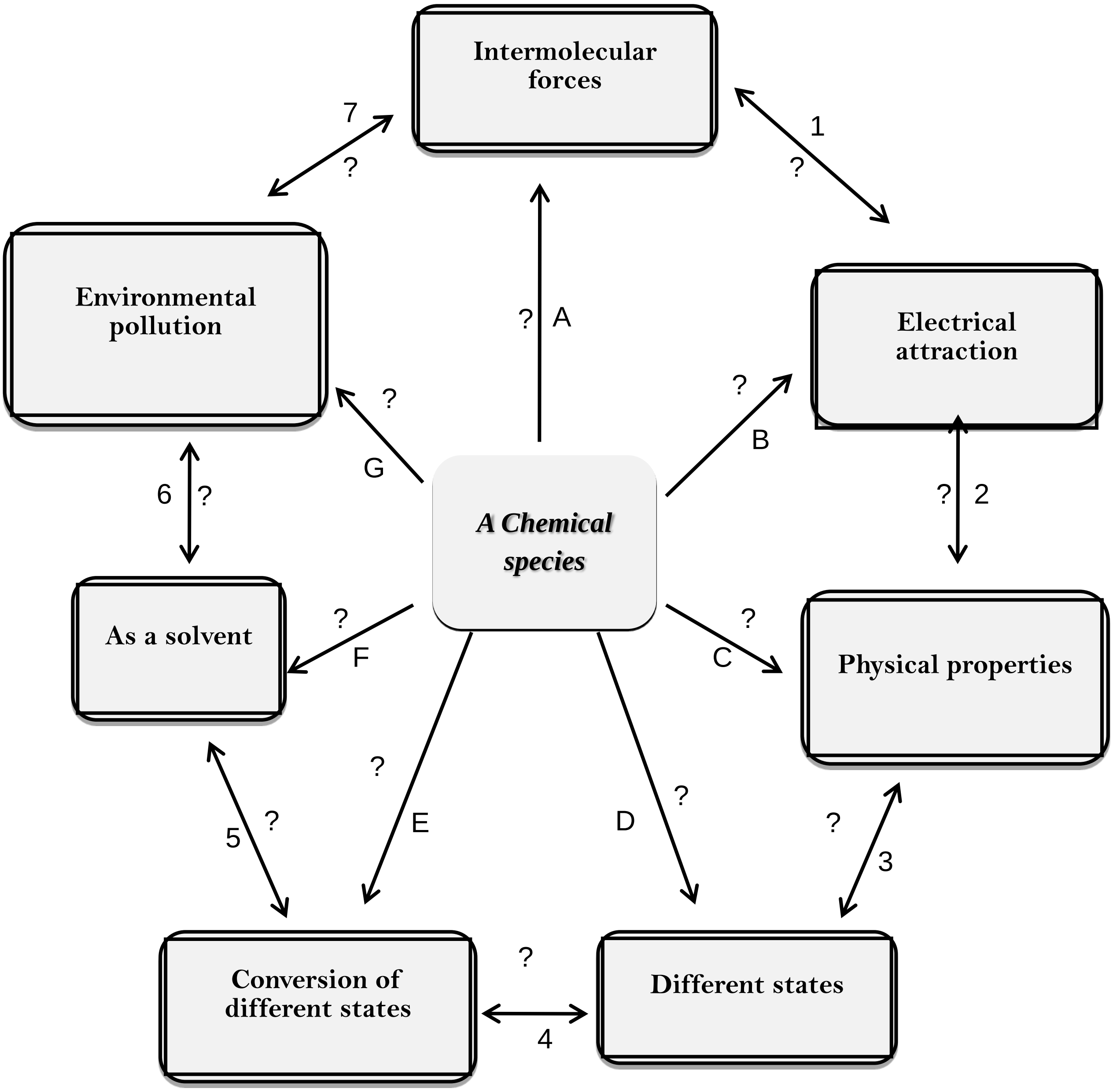

Fig-4: Systemic diagram (SD0) represents some of the properties of a chemical species.

In systemic diagram (SD0) Figure 4, all the relationships are unknown. These unidentified relations will be deciphered systemically. Following the explanation of intermolecular forces in a certain chemical species (A) and its connection with electrical attractions (1) within the molecules of a species (B) and also by discussing their relationship with physical properties (2) of the chemical, (SD0) can be altered to another diagram as shown in Fig-5 (SD1).

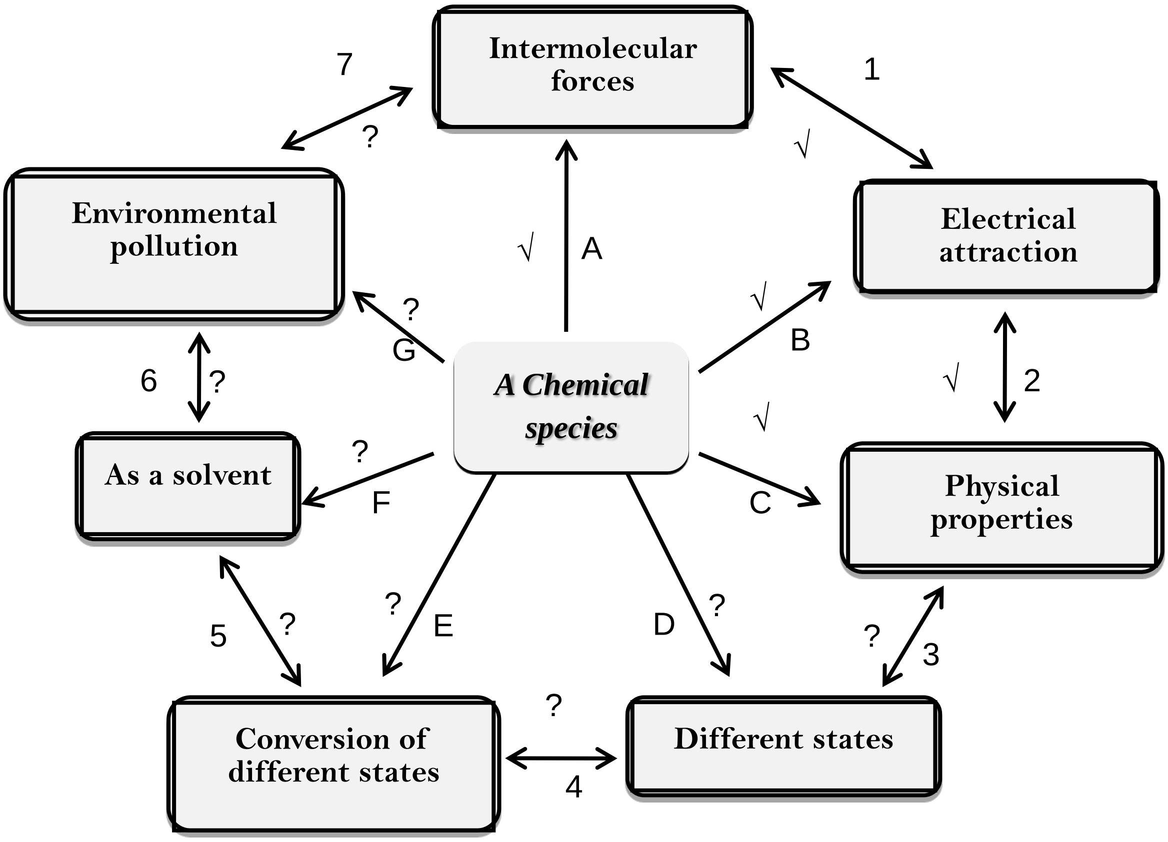

Fig-5: (SD1)

In Figure 5 (SD1) still there are some properties (D-G) and relationships (3-7), which have to be interpreted. After studying some of these properties and their relations Figure 5 (SD1) will be modified to Fig-6 (SD2).

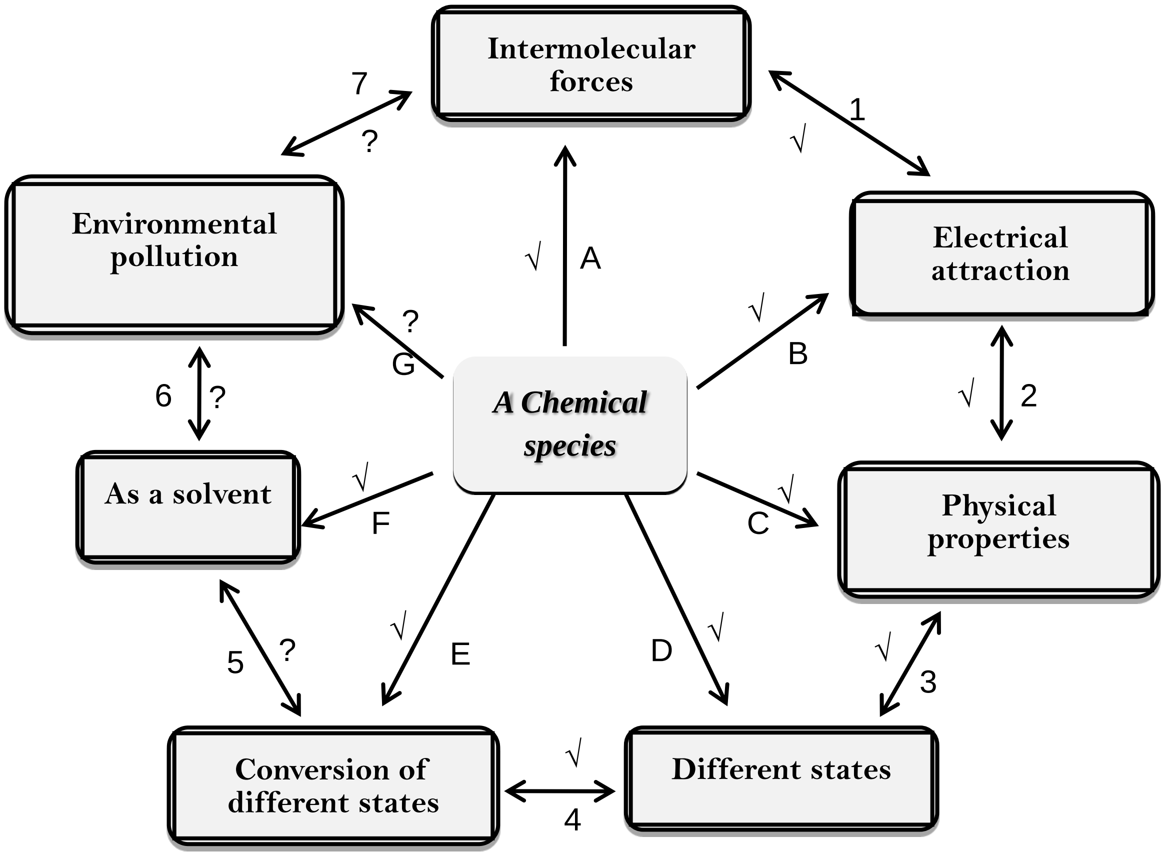

Fig-6: (SD2)

The remaining link of connecting this bogey of pertinent issues to the environmental pollution (G) for example its association with intermolecular forces (7) and nature of a chemical as a solvent (6), (SDf) can be acquired.

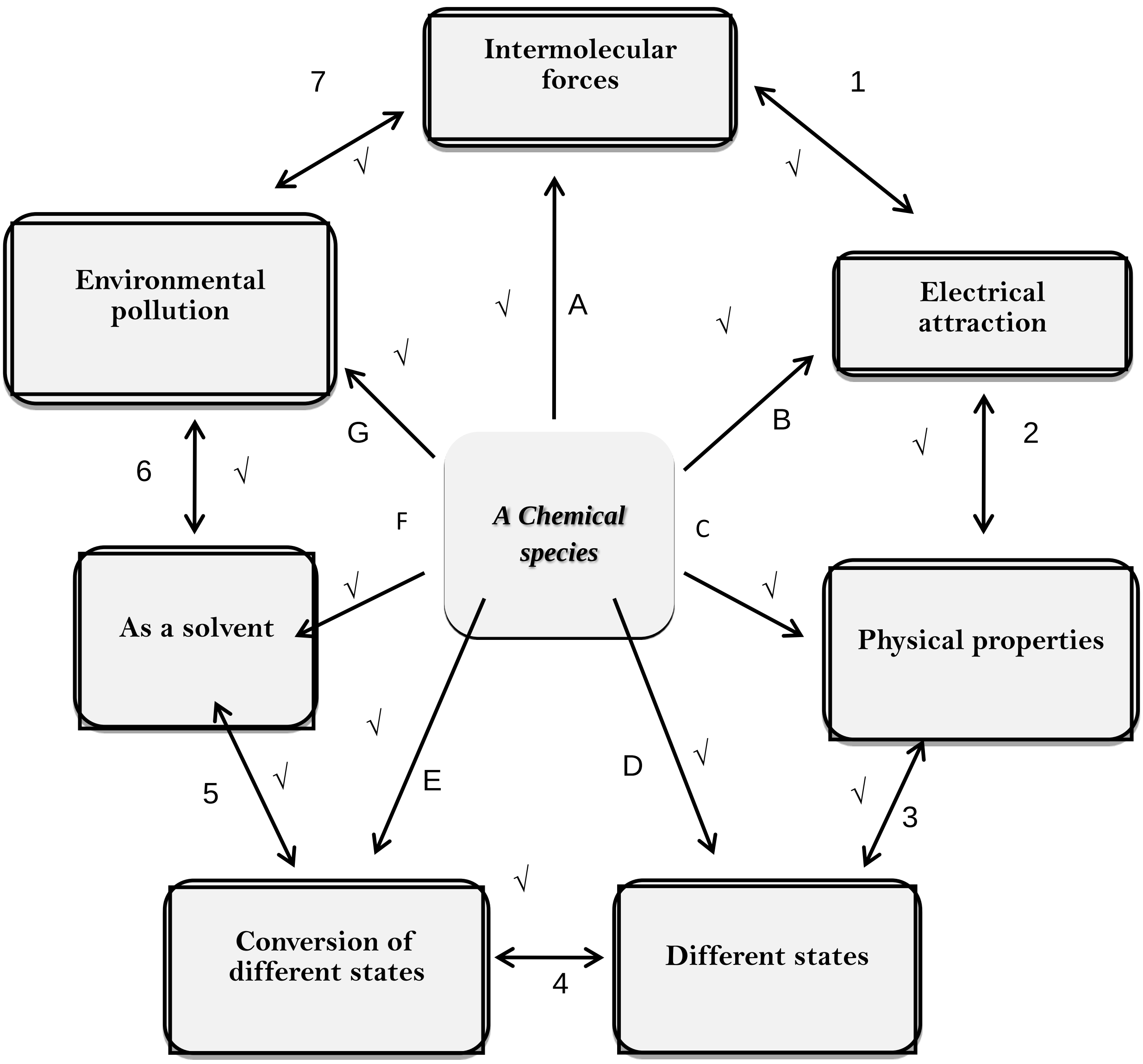

Fig-7: Systemic diagram (SDf) with known properties (A-G) and relationships (1-7).

Similarly the following systemic diagrams concerning different other issues can be developed (Fig-8, 14). All the systemic diagrams discussed can be related to Figure 7 so that a number of interrelated topics can be brought to focus in one display (Fig-15).

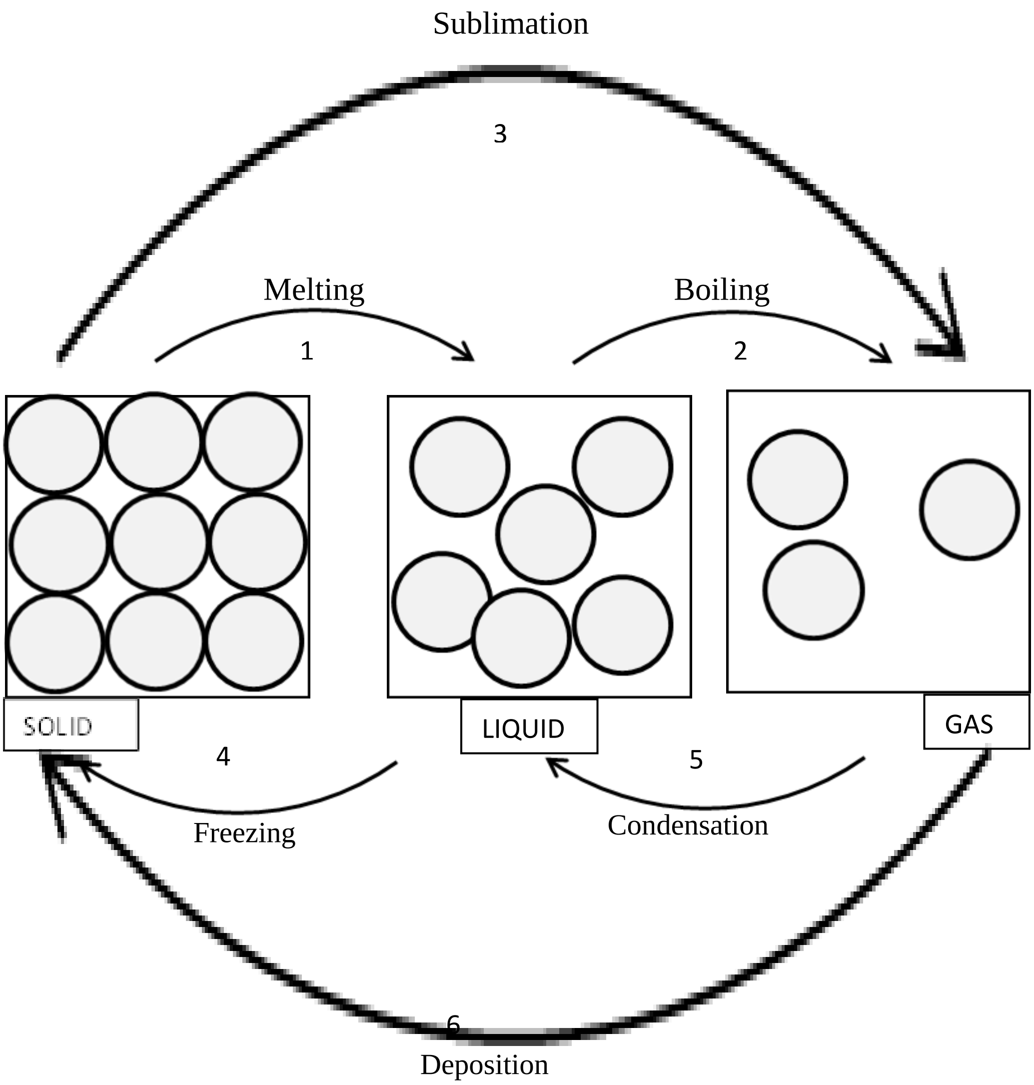

Fig-8: Systemic diagram (SD) represents interchange of one state into another.

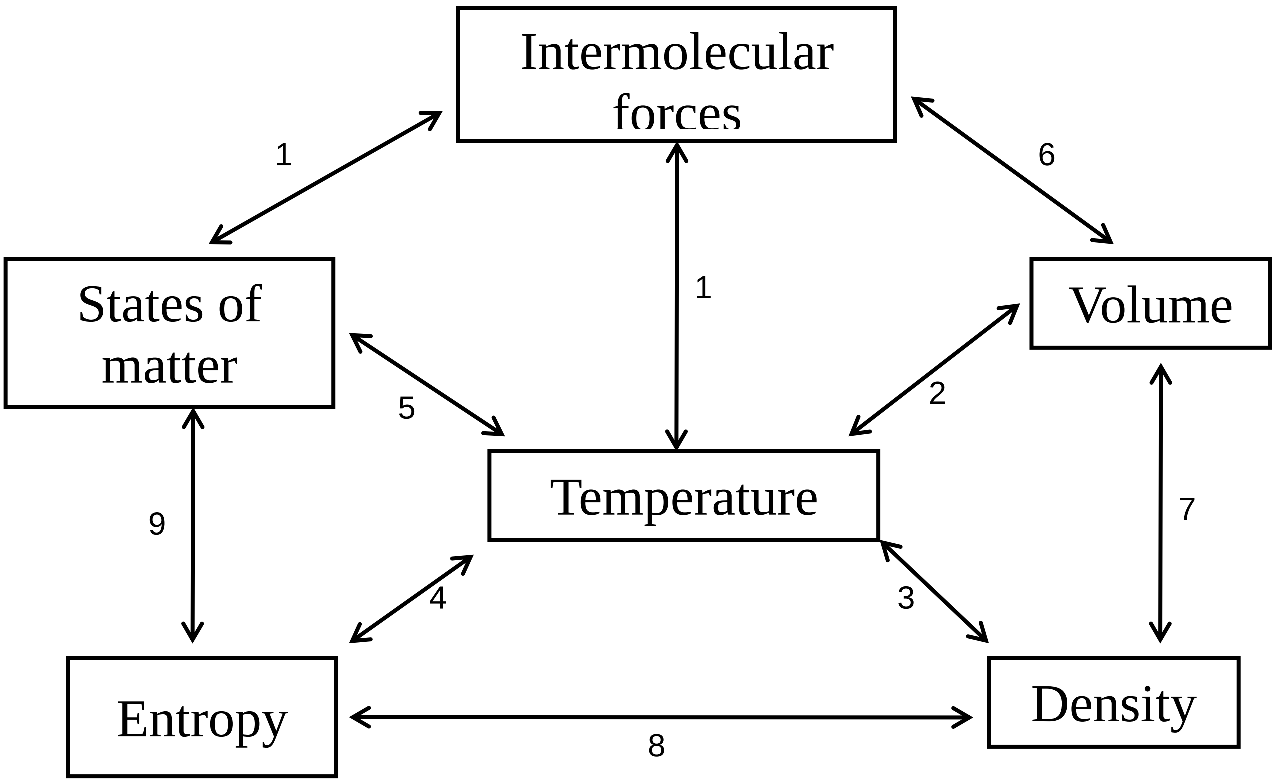

Fig-9: Systemic diagram (SD) represents association among various properties.

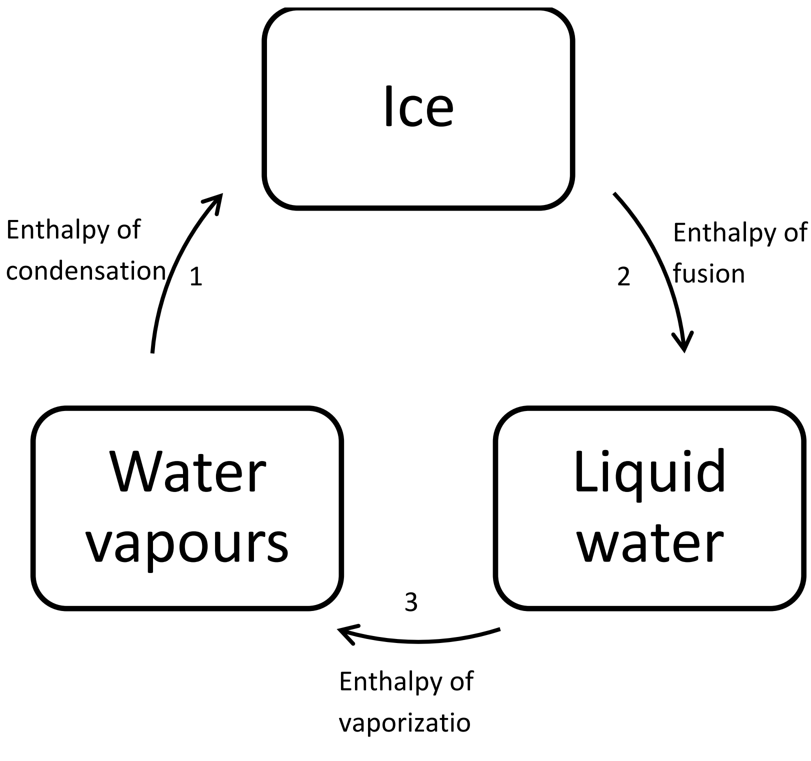

Fig-10: Systemic diagram (SD) represents the alteration of different states if water is taken as an example.

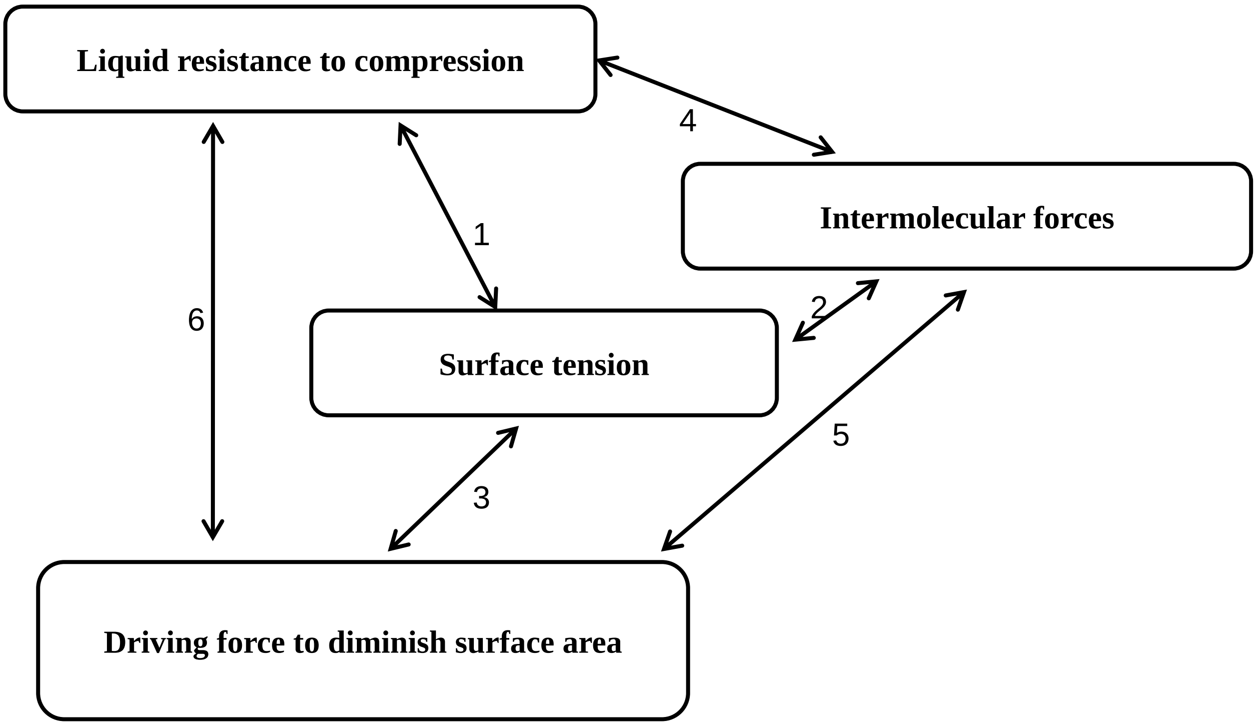

Fig-11: Systemic diagram (SD) represents some factors associated with the surface tension.

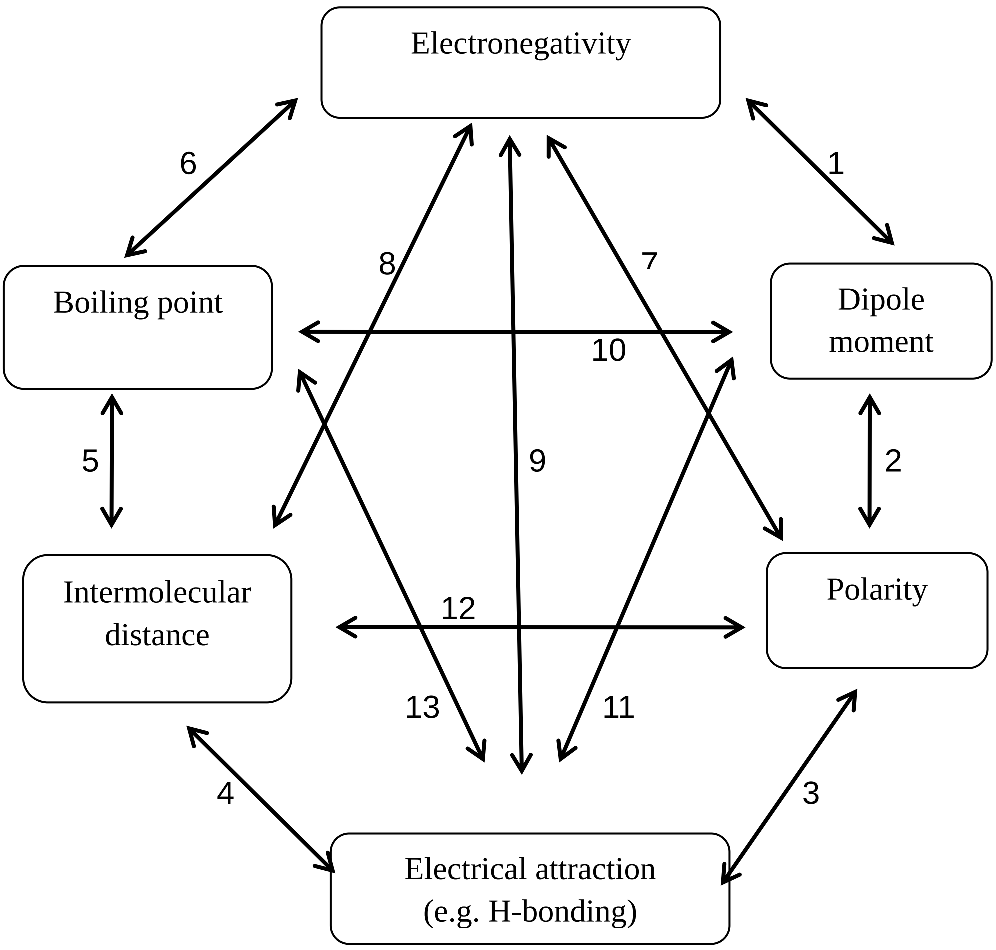

Fig-12: Systemic diagram (SD) represents relations between several other properties.

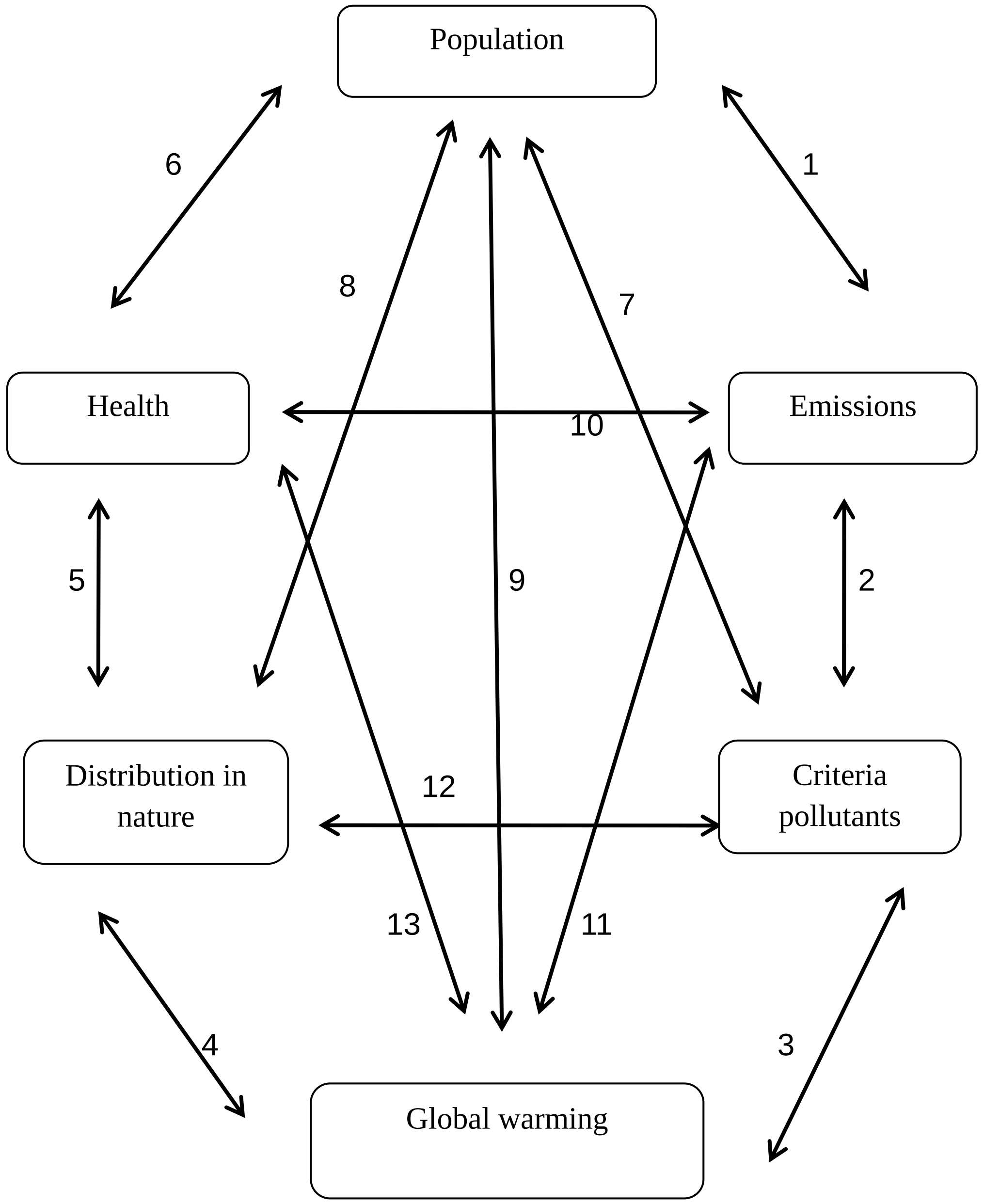

Fig-13: Systemic diagram (SD) represents some aspects of environmental pollution.

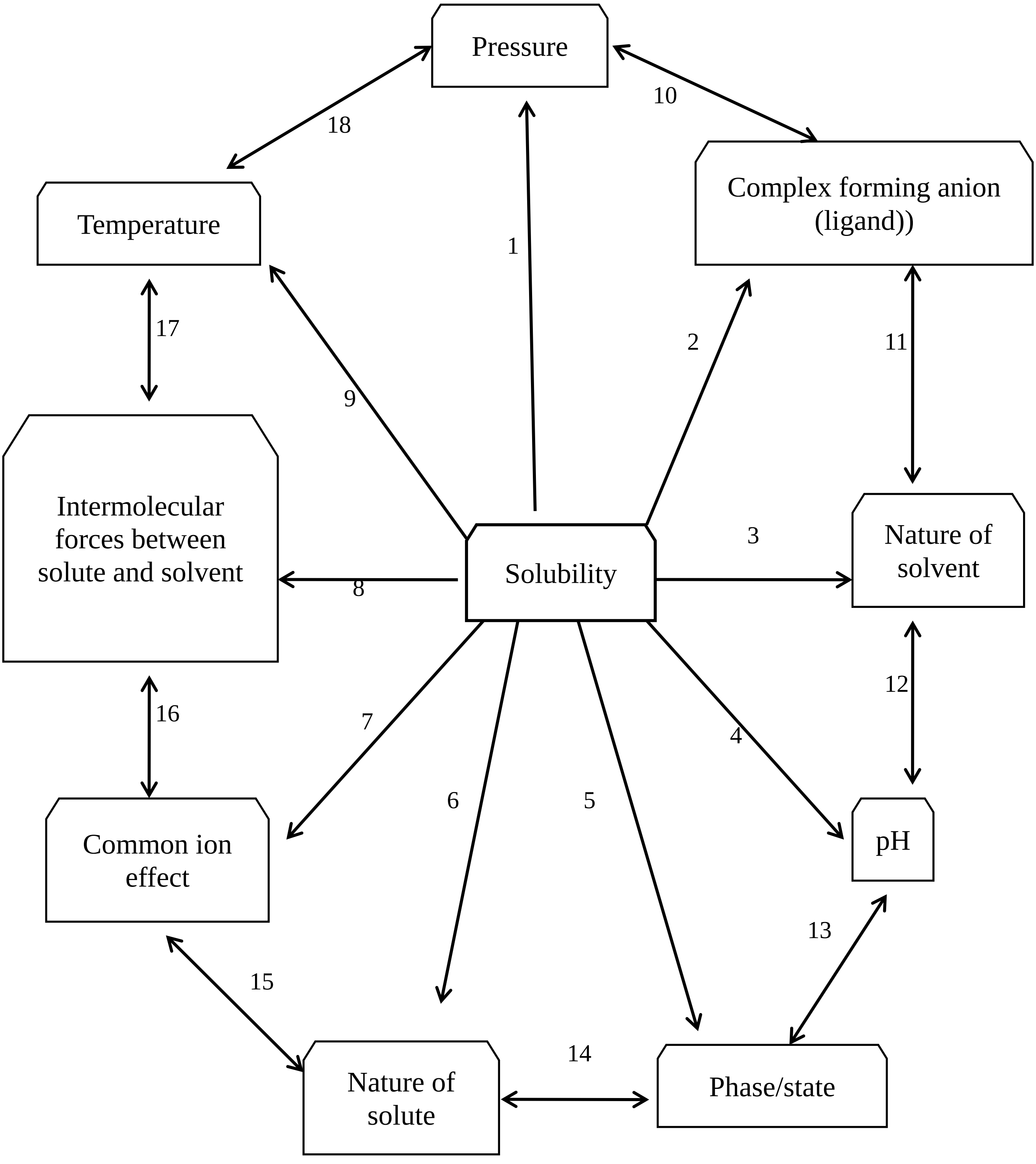

Fig-14: Systemic diagram (SD) represents solubility and its connection with a number of different issues.

3. SUMMARY

By using SATLC methodology while discussing a particular issue (SD0) is considered as a starting point. Through the understanding of a range of connections in (SD0) stepwise, finally systemic diagram (SDf) can be achieved. Systemic diagrams (SDf) for various topics can be presented together (Figure 15) to further clarify the subject.

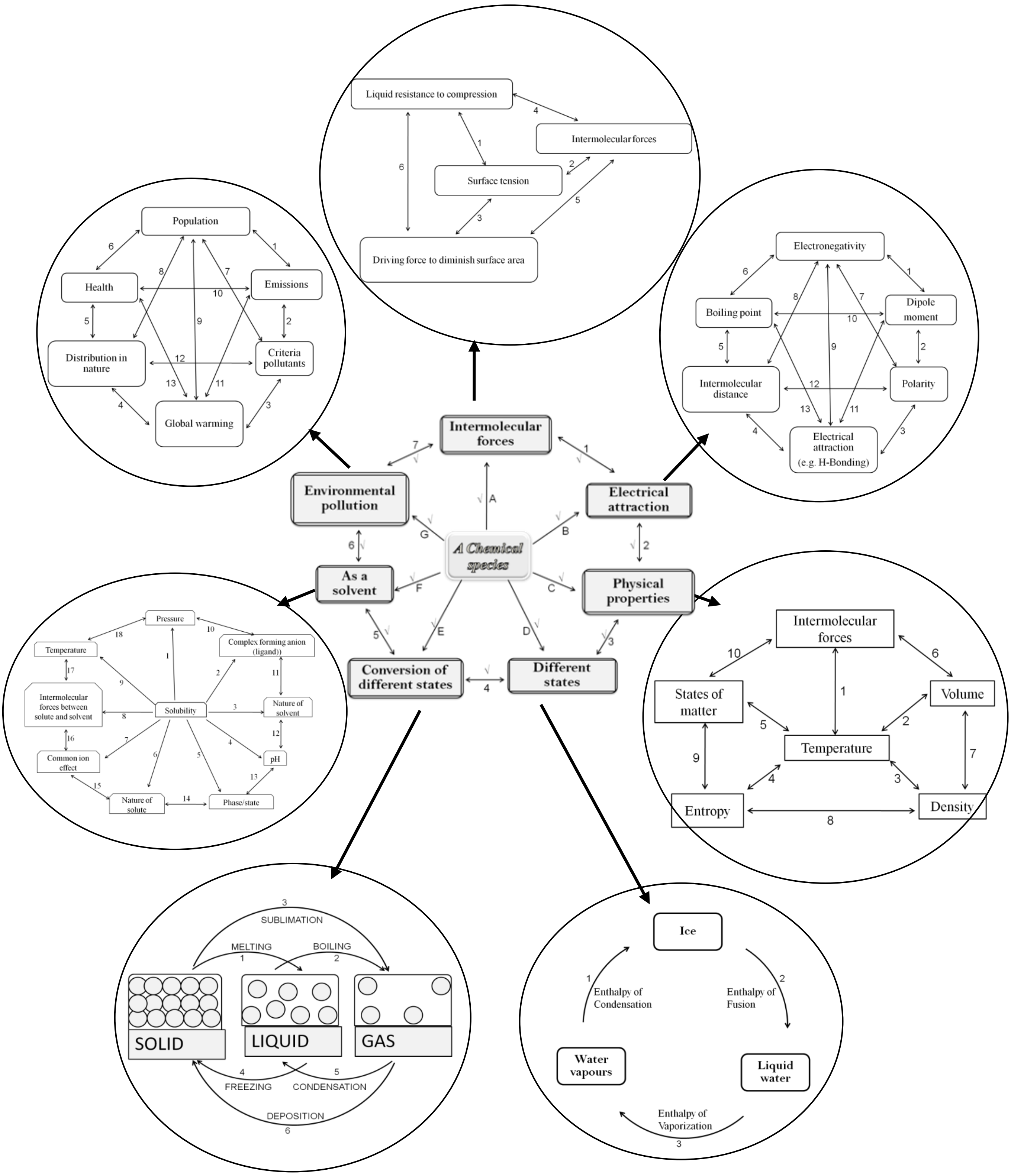

Fig-15: Figure represents a variety of subject matter in single display.

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