



Problematika Pembelajaran Kimia

Meeting – 2

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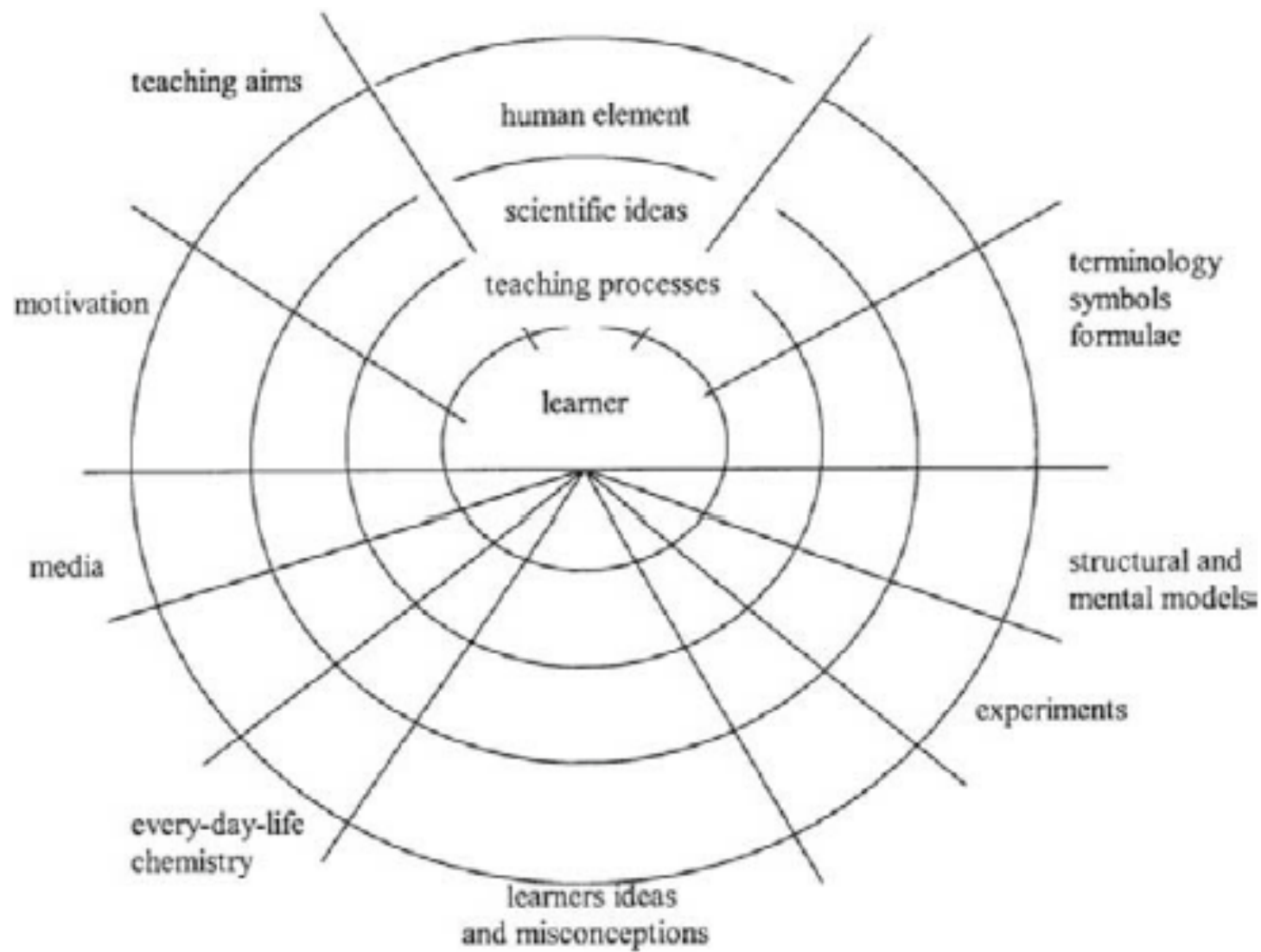
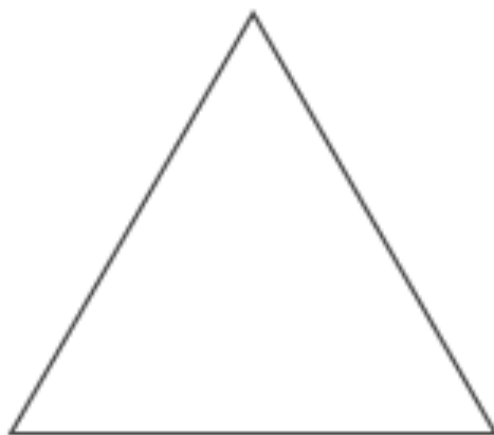


Fig. 0.1 Main subjects of a lecture in chemistry education, "pie-chart" metaphor [1]

Segitiga Kimia (Johnstone, 1991)

“Macro”: what can be seen,
touched and smelled



“Submicro”: atoms, ions,
molecules, chemical
structures

“Representational”: symbols,
formulae, equations, molarities,
tables and graphs

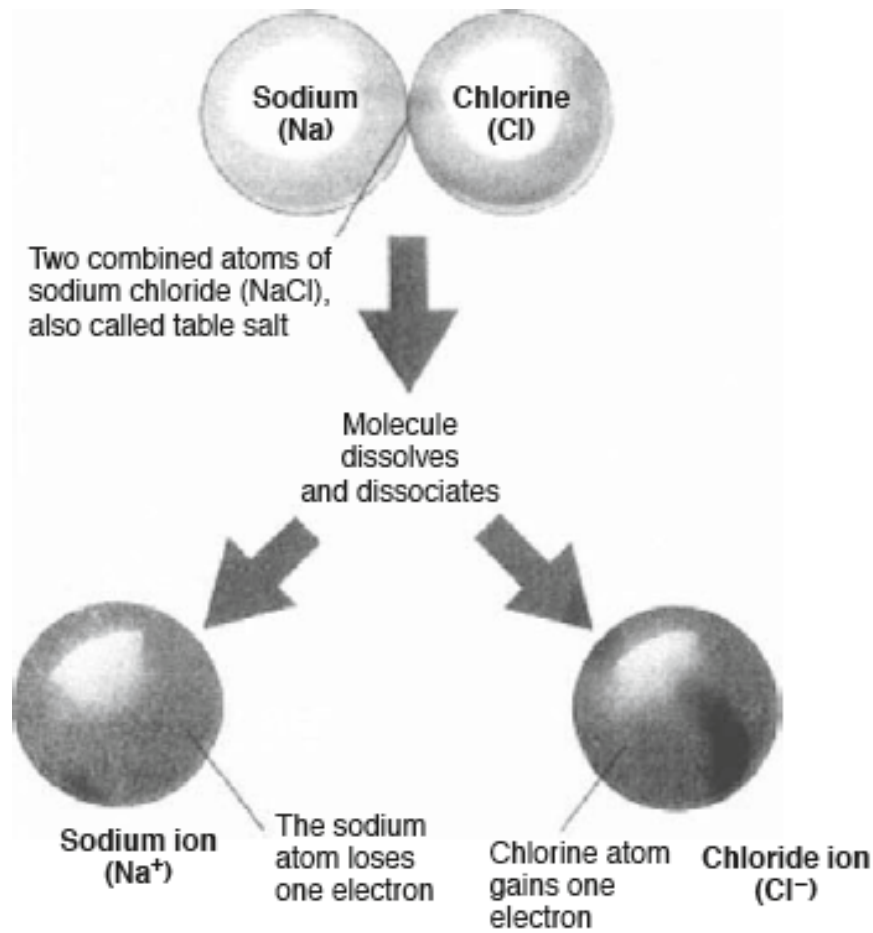
Misconceptions

- Students' conceptions that are different from those generally accepted by the scientific community have been called 'preconceptions' (Novak 1977), 'preconcepts' (Barke, et al., 2009) 'misconceptions' (Helm 1980). There is also the term "school-made misconceptions" written by Barke *et al.* (2009), they are mainly caused by inappropriate teaching methods and materials.

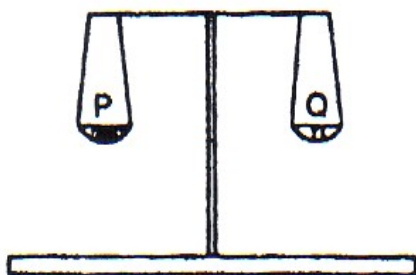
Preconcepts and school-made misconceptions

- **Preconcepts:** brought by children through observation in their every-day life: combustion („something is going into the air“), transmutation of substances („copper changes from red to green“), gases as substances („they have no mass“), etc.
- **School-made misconceptions:** developed by inappropriate teaching or difficult topics: chemical equilibrium („reactants and products show same concentration“), weak acids („they have a pH of 3 or above“), redox reactions („oxygen is always involved“), etc.

Misconceptions related composition of salts



Preconcepts of children: Children 's ideas in science (Driver 1985)



A small amount of iron wool was placed on pan P, and weights were added to pan Q to balance the scales.

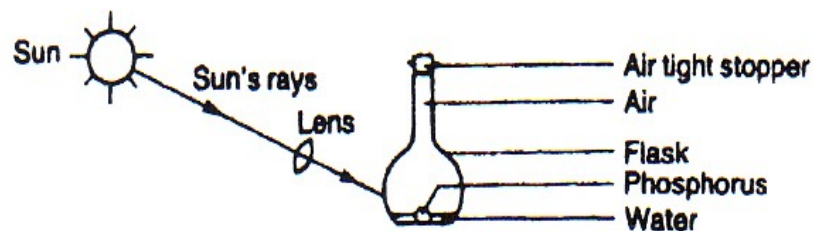
The iron wool was then removed and heated in air.

It formed a black powder which was carefully collected and returned to pan P.

What do you expect to happen to pan P?

Explain the reason for you answer.

I expect pan p. was lighter...
because by heating it certain
things were being burnt away
and so making it lighter...



A piece of phosphorus was held in a flask as shown in the diagram. The mass of the flask and contents equalled 205 g. The sun's rays were focussed on the phosphorus, which then caught fire. The white smoke produced slowly dissolved in the water.

After cooling, the flask and its contents were weighed again.

(a) Would you expect the weight to be:

- A More than 205 g
- B 205 g
- C Less than 205 g
- D Not enough information to answer

Tick in the box
next to the
answer you
choose.

(b) Give the reason for your answer:

Nothing in the container could escape but the smoke has dissolved and the phosphorus destroyed making it weigh less...

Mengapa miskonsepsi terjadi?

- Seimbang dalam segitiga Johnstone mudah jika kita sebagai Chemist dan guru kimia, namun bagaimana dengan peserta didik?
- Gabel (1999): *It is that chemistry introduction occurs predominantly on the most abstract level, the symbolic level*
- Penggunaan yang kurang tepat dalam “representasi kimia”

Pengembangan Tes Diagnostic untuk identifikasi miskonsepsi
(Treagust, 1998)

Menetapkan konten

1. Mengidentifikasi pengetahuan
2. Mengembangkan peta konsep
3. Menghubungkan pengetahuan dan peta konsep
4. Validasi konten

#mencari informasi mengenai miskonsepsi yang dimiliki siswa

5. Mengecek literatur terkait
6. Melakukan wawancara tidak terstruktur kepada siswa
7. Mengembangkan butir soal “multiple choice” dengan diikuti alasan

#mengembangkan test diagnostik

8. Mengembangkan test diagnostik berbentuk “two-tier”
9. Mendesain kisi-kisi
10. Perbaikan yang kontinu

Diskusi contoh

- **A. L. Chandrasegaran, David F. Treagust and Mauro Mocerino**· *Chemistry Education Research and Practice*, 2007, 8 (3), 293-307
- Mengerjakan salah satu PTDI