

Students' Activities During Labwork in Physics and Chemistry

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Labwork in French upper secondary school

a long long story ...

1902

5 or 6 labwork sessions a year

1931

1 labwork session each week

now

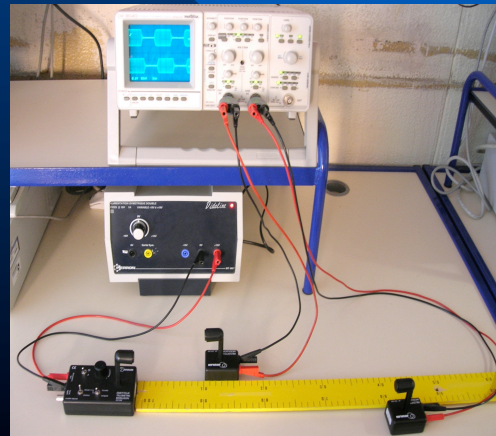
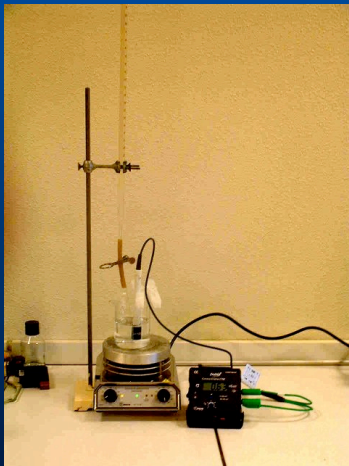
1h1/2 each week for all students (15 years old)

2h (or more) each week for students who learn science

Practicals in physics and chemistry in lower and upper secondary school

Brief description

- Small groups of 2 or 3 students in a specially equipped laboratory
- scientific equipment for each group : tailor-made for schools standard

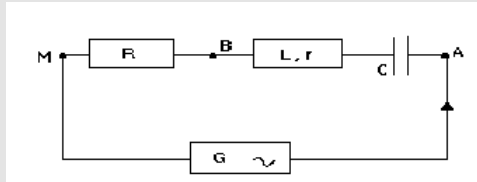


Practicals in physics and chemistry in lower and upper secondary school

LES OSCILLATIONS FORCÉES D'UN DIPÔLE RLC

I. Mise en évidence des oscillations forcées

Réaliser le montage.



Compléter le schéma

Représenter les courbes $u(t)$ et $i(t)$

II. Le phénomène de résonance d'intensité

Placer un ampèremètre

Faire varier la fréquence et relever ... les valeurs de f et de I .

Tracer le graphe $I(f)$.

Déterminer la valeur de la fréquence

Observer et représenter les courbes

représentant $u(t)$ et $i(t)$ à la résonance.

III. Étude de la résonance d'intensité ...

Brief description

- Small groups of 2 or 3 students, in a specially equipped laboratory

- scientific equipment for each group tailor-made for schools standard

- generally, a worksheet instructs the students what to do

What are the learning objectives to laboratory work ?

- **Connecting ideas, objects and phenomena**
- **Acquiring experimental skills**
- **Acquiring an experimental process**
- **Increasing motivation, personal development, social integration**

French physics/chemistry curriculum B.O. HS n°7, 31 août 2000

An analysis of labwork tasks used in science teaching at upper secondary school and university levels in several European countries (2000) Tiberghien A. et al.

What students do during laboratory work ?

An example : Carrying out a titration in a logical way



Question : using the informations from your document and equation of the reaction, suggest an explanation for your observations.

What students do during laboratory work ?

An example : Carrying out a titration in a logical way

Y : All of MnO_4^- has been used because there's no purple, all MnO_4^- was used.

Au : Yes.

Y : There some iron left and...

Au : We don't know which one

Y : What ? But we don't even know

Au : Well no..

Y : Maybe some Fe^{3+} was made with some Mn^{2+} .

Au : Yeah, maybe, yeah..

Y : no colour plus light brown, it makes very light brown.

Au : Yes. But, green ? Don't know, there's some pale green here and there.

Y : Can we leave Fe^{2+} with a question mark ?

Au : OK.



Description of the instructions to students

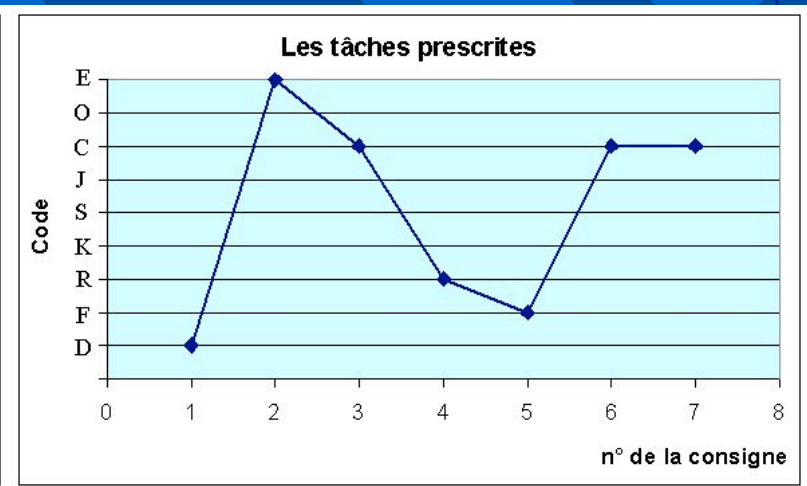
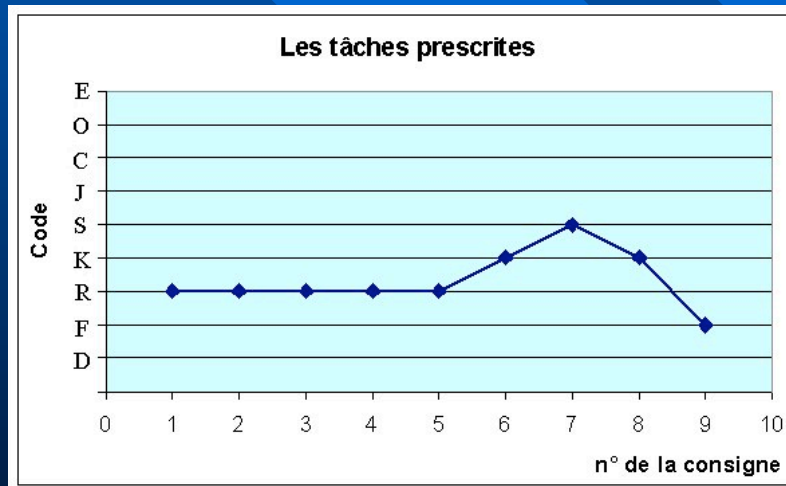
- ◆ E. Using information from a text, a table, etc..
- ◆ O. Observing, with or without manipulation
- ◆ C. Choosing, guessing, suggesting
- ◆ J. Assessing the quality/validity
- ◆ S. Sketching/drawing
- ◆ K. Calculating, analysing (numerical results)
- ◆ R. Realising, carrying out an experiment with objects or instruments
- ◆ F. Giving an answer, a result
- ◆ D. Telling/writing down a (required) piece of knowledge

Analysis of the instructions

E
O
C
J
S
K
R
F
D

Comparison of two worksheets

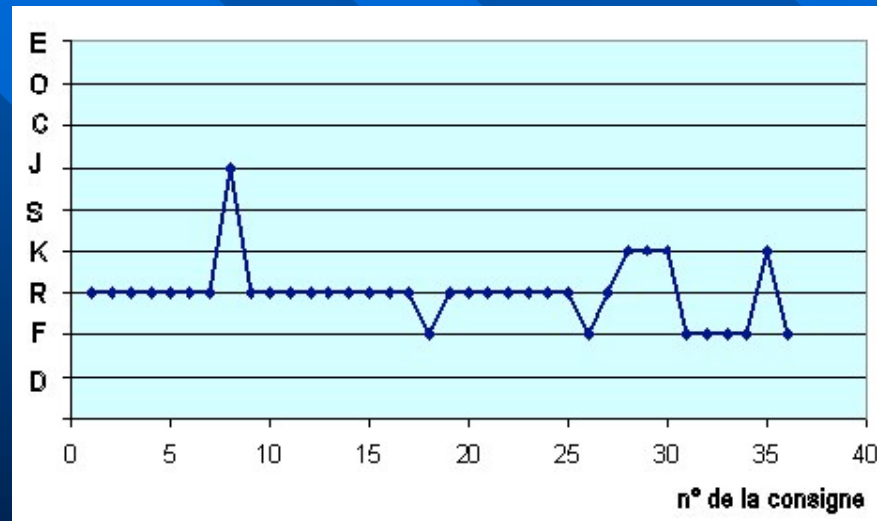
Same topic and teaching objective : Boyle's law



Analysis of the instructions

Another example in the science course

Driven oscillations of an RLC circuit



E
O
C
J
S
K
R
F
D

To conclude

Curriculum

Duration

Equipement

Organisation

Constraints

Students

Scientific
learnings

Teacher

Assessment

Students

To conclude

Tools for a reflexive analysis

