BLOQUE 2 LA MATERIA

Suggestions and ideas

	LEARNING CRITERIA	Text book	**Activities, investigations and differentiated learning**
1	1.1. Distinguish between general properties and the specific properties of the material using the latter for the characterisation of substances. Metals, non-metals, ceramics, polymers and compounds. 1.2. Relate the properties of the materials in our surroundings to the use we make of them.		**Activity:** Show a photo or supermarket leaflet . Ask why do we classify things? Discuss advantages of classifying things: easier to spot patterns, find and put away … **Activity:** Prepare trays with a variety of materials that include metals, non-metals, ceramics, polymers and compounds. In small groups ask students to classify objects. There will be a variety of interesting possibilities. **Activity:** Present a list of properties: boiling point, melting point, density, weight, volume and mass, for example. Ask students to determine which properties are general and which are specific. **TIC Activity:** Choose materials for building in different locations and explain why. Group 1: Clay terrain Group 2: Area of tropical storms and flooding Group 3: desert area Group 4: swampy terrain… Depending on the groups they will need to investigate the conditions of the zones assigned and materials they are interested in. The difficulty can be adjusted limiting the materials they can choose from or letting them discover the range that exists. Include the density of the materials chosen.
2	1.3. Describe the experimental determination of volume and the mass of a solid, in the lab and calculate its density. 2.1. Use and name the correct equipment for measuring: mass, length, time and temperature. Express the results using the international system of units.		**Investigation:** They will need calculators. Determine the density of the various objects (g/cm^3). Use scales to measure mass and rulers or string to measure the volume ($cm^{3)}$. The difficulty can be adjusted depending on the objectives. Ac**tivity**: Design a table to record the results of the activity or make up some results. They can compare densities with the real ones and discuss possible reasons for any discrepancies. **Activity:** Give students a table with three columns, with results for volume and mass. Students must calculate the density. To make it easier some examples can be included and some mass and volumes included with blank densities. **Activity :** Write a conclusion of the material used to build an aeroplane and explain why. For differentiation you can include examples of other modes of transport and materials used.
3	3.1. Explain gases, liquids and solids using the kinetic-molecular model. Conservation of mass in changes of state.		**Activity:** In one minute make a list of things that surround them. Then classify them into solid, liquid or gas. (This is an opportunity to comment on why most objects are solids as gases are not often visible and liquids need to be contained. **Activity:** Read out loud properties of states of matter and on mini whiteboards students need to write if it refers to a solid, liquid or gas.

			Activity gases: At the start of the class spray in a corner any perfume with a diffuser. Ask students to raise their hands when they can smell it. It's important they do it when they can smell it not because their partners have. You can put a mark on the board to represent those who have put their hand up to spot the pattern and they can put their hand down. **Activity liquids:** Give a list of properties of liquids and students must determine if they are true or false. . **Investigation liquids:** Give various containers of different shapes. Write a hypothesis stating whether the water will change mass or shape. Ask them to measure 100ml of water. Weigh the container before and after it has the 100ml of water. Pour the water into the various containers, check the volume hasn't changed but the shape has. Weigh at the end to check it hasn't change. Finally conclude if the hypothesis is correct or not. . **Activity solids:** Use the list of solids from the start and write a list of properties they have in common. . **Investigation with the three states:** Give a long list of properties. Students must determine experimentally which properties belong to which state of matter. Some properties can belong to more than one state. Depending on the group, give them the equipment necessary without explaining what they have to do and let them explore. . Equipment: Water. Cubes of any solid material. Balloons with air. Check if they can be compressed: plastic syringes sealed with glue, one with sand, one with water and one with air. . Check shape: Containers of different volumes and shapes. Measure volume: measuring cylinders and rulers. Conclusion: how do you think the particles are arranged. Depending on the group, you may need to show them the three options and let them choose which would be best for each state. **Activity:** Create models with pasta, plasticine, balls of any type, material that can create three models of how they are organised by particles. .
4	3.2. Describe and interpret the change in states of matter, using the kinetic-model Understand the conservation of mass and the existence of energy interchange in a change of state Can apply it to interpret everyday phenomenon.		**Activity:** Give three cards, each one with gas, liquid and solids. They must arrange the cards in order of increasing energy. Copy and add red arrows. Repeat with decreasing energy. Copy and add blue arrows. Add the name of the processes above the arrows. Depending on the group, you could have the names of the processes for them to choose from. **Investigation**: Measure the mass of an ice cube and the temperature of it. Students must predict if the mass and temperature will change after the ice cube melts. Let the ice cube melt. When it is liquid, measure the mass and temperature. Use a Bunsen burner to heat the liquid until it evaporates. Ask the students what is happening with the energy added by the Bunsen burner. **Activity:** Ask the class or smaller groups to behave like the particles in each state of matter. With chalk or similar you can draw the shape of the container on the floor. Start with a solid so they are arranged in an organised way and they vibrate. The teacher can be the Bunsen burner, what will happen to the particles? They will move more but stay

			in the container. They can move as liquid into a differently shaped container. Lastly, they can move so much that they separate randomly as a gas. If the classroom doesn't allow for this, this activity works well outdoors.
5	3.3. Check the density of water in its solid state and liquid. Explain the importance for life of the phenomenon of the anomalous dilation.		**Activity:** In pairs, analyse a table of density of the three states. Conclusions: solids are denser. Explain why, thinking of the particles. **Activity:** Why does ice float? Create models of water and ice to visualise the difference in density and to explain why they float. **Investigation:** Why do things floats? Design a table that includes predictions and results of objects that float. In a container with water add a variety of objects to determine whether they float or not. If you can, include a sponge or porous objects so they think about why they sink.
6	3.4. Deduce from graphs of the heating of a substance, its boiling point and melting point as well as identify it using tables with the necessary data.		**Activity:** Give students some results to present in a graph. They must explain what is happening in each phase with reference to particles. **Activity:** Give various graphs so they choose which one shows the expected results when water is heated.
7	4.1. Justify the behaviour of gases in everyday situations relating it to the gas laws and the kinetic-molecular model. Interpret the concepts of temperature and pressure through a model in a qualitative form and relate it to the gas laws (qualitatively)		**Activity:** In one minute the students write all the gases they know. **Activity:** Give students a table with information of a variety of gases including oxygen, nitrogen and chlorine. You can make it harder by including more or less information of gases or let them search for the relevant information (TIC). Determine, using the tables, which gas would be best to put into crisps bags. Desired properties, non-toxic, not reactive with bag or crisps, inexpensive… **Investigation:** Pour 50 mL of water in a conical flask of 125ml. Put a balloon over the top to seal it. Place conical flask in a container with warm water and a thermometer (alternative a hot plate but not a Bunsen burner. The students observe what happens to the balloon. Let the students determine how to measure the balloon's volume for example using string and a ruler measure the circumference. The same students or another group can repeat using cold water in the container and new conical flask. The circumferences can be compared visually too. **Activity:** Shake a can of soda and pretend you are going to open it. Students should react knowing it will spray everywhere, ask questions related to pressure. **Activity:** In a tray have products such as aerosols, a small extinguisher, soda cans, small tire (alternatively have a page with photos of these ítems. Ask students to imagine they are in charge of writing the safety indications on the labels. What would they write? Examples would be don't shake the cans, don't leave in warm places or near a naked flame. They must justify what they have written. **Activity:** Use chalk to draw on the floor two squares a small and a big one. If you cannot draw on the floor use two table clothes of different sizes. The small square should fit 10 students standing up. Ask 10 students to stand up and act as gas particles in the biq square. Afterwards explain there is a reduction in volume when they change to the small square. Ask students so students can relate it to pressure.

			Activity: Use a plastic bag or balloon and a large plastic sheet. Place the open bag open over the table, sealing the edge with tape and leaving a small space to introduce a hairdryer. Use cold air to avoid discussion about temperature. Observe and ask them to explain why it " grows". Relate it to the pressure the air causes. Afterwards place the large plastic over group of crouched down students or sitting on the floor. Initially it will be squashed like in the bag. Ask them to bang the plastic with their hands, stronger each time and faster to observe the pressure. This way they can relate pressure to the collisions of the gas particles to the container's walls. We can vary the volume (size of plastic) and temperature (strength and speed of banging) and the number of particles (number of students under the plastic). This will allow a discussion of simple gas laws. They can write the role-play for each situation and predict the result previously.
8	4.2. Interpret graphs, tables of results and experiments that relate the pressure, the volume and the temperature of a gas, using the kinetic-molecular model and the gas laws.		**TIC Activity**: Investigate the scientists and experiments that contributed to the discovery of the gas laws. **Activity:** Do calculations so they can determine the gas laws themselves using tables and graphs.
	5.1. Distinguish and classify material systems of everyday use in pure substances and mixtures, identifying if they are homogeneous mixtures, heterogeneous or colloids.		**Activity:** Analyse labels of mayonnaise. Main ingredients, oil and vinegar. Ask students to mix oil and vinegar. Why don't they mix? You need leticin from egg. **Activity:** Give two or three samples of each type of mixture and ask them to determine what each mix has in common. They can make suggestions as to why there are differences. They can add more examples of everyday use and determine the category they would belong to.
9	5.2. Identify the solvent and solute when analysing homogeneous mixtures of special interest.		**Activity:** Identify which is the solute and which is the solvent. Give various examples 1. Brine 2. Powdered chocolate and milk 3. Powdered coffee and water 4. Tea leaves and water **Investigation:** Which solvents dissolve chocolate powder? Students plan an investigation to see which solvents dissolve chocolate powder. The solute they will investigate is chocolate powder. Try a variety of solvents: milk, water, alcohol, apple juice… They can investigate different factors such as temperature and saturation.

10	5.3 Carryout simple experiments to prepare solutions, describe the procedure and the equipment used, determined the concentration and express in grams per litre.		**Activity**: Show the map of NASA salinity of the oceans of 2011, easy to find on internet. Ask them in groups to suggest how it was measured. **Activity**: Give students article of NASA on the salinity of the oceans that includes the impact this information can have. **Activity TIC:** Investigation how to measure the salt of the sea. Tadiometres. Other inventions to do with measuring salt concentration could be included. **Investigation:** Each group prepares a solution with a specific concentration and after label the solution with a letter A-D for example. Share solutions out with the groups. Each group has to determine the concentration. Afterwards they can check if it coincides with the other group's concentration who prepared it.
11	6.1. Design and carryout methods of separation of mixtures according to the characteristics of the substances they are made up of, describing the lab material needed.		**Investigation:** (Make and separate an alien soup.) Mix the iron fillings, carbon powder or paste, copper sulphate and water. They must devise a method to separate them, they must name the equipment used. It can be done in two lessons. The iron fillings should be separated with a magnet. The carbon filtering the solution. Copper sulphur heating the mixture so that water does evaporate and leave the crystals.