

## **Mineral Deposits**

*Mineral deposits of the British Isles*

**D**

*Make a display of British minerals. Use a sheet of pegboard with the map in the centre and the minerals around the sides with string or arrows to show where they are found. This can then be hung on a wall.*

*Light bulb display*

**D F**

*This display is to give students some idea of the huge variety of minerals that our civilisation uses. Make a display with a 100 watt light bulb in the centre and samples of all the 12 minerals that are needed to make the different parts. The display can also show how they are extracted, what type of deposit they come from and which country we get most of our supplies from. Use pegboard if you want a vertical display.*

*Geology of the light bulb*

**Pa I F 10 min**

*Students use the diagram to list the different minerals used to make a light bulb and the different methods of extraction.*

*Uses of minerals*

**A I 30 min**

*Students choose a mineral and must find out about its occurrence and use. Then they either tell the class or write about it.*

*Mineral use web*

**D**

*Make a display board with a common mineral in the centre and all its uses radiating from it. See R.H.S. Robertson 1961 (still available on Amazon) Mineral use guide - Robertson's spiders 'webs*

*Composition of the earth's crust*

**Pa I F 10 min**

*Students use a list of crustal abundance of elements to give the abundance in the crust of the following elements: aluminium, iron, copper, tin, zinc, lead, gold, silver, mercury.*

*Calculating ore grade*

**Pa I F 10 min**

*Students have to calculate the ore grade from the amount of metal in an ore and from the chemical formulae for various minerals.*

*Concentration Factor*

**Pa I F 15 min**

*Students calculate the concentration factor from the average cut-off grade and the concentration in the crust.*

*Ore grade*

*A I F 15 min*

*Students are given a piece of ore containing only galena and calcite and separate samples of galena and calcite. They must work out the density of the two minerals and the piece of ore using a spring balance and a jar of water. They can then calculate the grade of the ore.*

*Rand conglomerate placer deposit*

*D*

*Get students to examine a piece of this and tell them more money has been made from mining this rock than any other.*

*Clementine*

*G*

*Provide students with copies of the song Clementine (dwelt a miner forty-niner) which is about placer mining in the 1849 gold rush in California. Sing it at an appropriate time in the lesson.*

*Placer deposits 1*

*D*

*Place a small amount (5cc) of sand mixed with galena of the same size in the base of a 1 litre beaker. Very gently fill the beaker one third full of water. Show the students the beaker including the underneath, only sand should be visible. Now swirl the water around. Look underneath and all the galena will be visible in the centre. Using a torch or the light from an overhead projector makes it very clearly visible.*

*Placer deposits 2*

*E P E 10 to 15 min for each activity*

*These experiments simulate the formation of different types of placer deposits*

*Students pour water onto mixed sand and galena in a round bottomed glass. The overflowing water removes the sand but not the galena thus simulating*

*plunge pool placer deposits. Students pour water down a piece of guttering with ribs. Mixed galena and sand placed in the guttering separates. Air from a hair dryer is blown over mixed sand and galena. The galena is separated from the sand.*



### ***Panning for gold***

***A or D I 5min***

***Place about half a litre of sand in a panning dish (obtainable from Geosupplies and other dealers). The panning dish rests in the middle of a large tray, about 90cm by 60cm. Put a small piece of gold or galena the size of a large sand grain on top of the pile of sand for students to see and then pour a further half litre of sand on top so that the gold is buried. Pour water into the pan and then holding it with both hands swirl it around for 30 seconds and then continue swirling but tilt the pan so that water and sediment can slowly escape on to the large tray. Continue until only a little sand is left adding water when necessary. When only little is left one final swirl should leave the gold in the tail of the remaining sediment. I have use a squashed link from a gold chain for 30 years and my students never fail to find it. Panning is best done outside on a sunny day because the gold and galena glints in the sunlight.***



**Placer minerals**

Pa I F 10 min

Students are given a list of minerals and must look up their properties to find if they will be placer minerals. They must be denser than 2.7, have no cleavage or poor cleavage and be chemically resistant to oxidation.

**Immiscible liquids in magmatic deposits**

D

Use two fluids of different densities in a bottle. Shake the bottle to mix them up and then put it on the desk to let them separate.

Aromatherapy bath oils sold by Tesco work well.

**Gravity settling experiment**

E P F 30 min per mineral

The speed of fall of olivine, augite and plagioclase is measured in glycerol and then adjustments are made to calculate the speed of fall in basic magma

**Fault controlled deposits model**

D

Use a model of a normal fault with changing angle of dip to show how movement creates gaps for ore to accumulate in. The first model has one gap to show how they are formed, the second has several gaps to show the alignment of the deposits.



**Model of veins and granite body**

D

This model is made of painted blocks of wood. The four layers show how the distribution and type of ore varies with level of erosion.



### **Level of erosion**

**A P or D F 10 min**

*Students are provided with a section showing the relationship of mineral veins to a granite body. The top of the paper represents the current land surface. Fold back or cut off the top 5cm. the top now represents the surface after some erosion and veins are now outcropping. Further erosion-folding bring the granite to the surface with many veins. Erode still further and there is only granite, no veins. Students can draw a very simple map representing the geology at each level of erosion or select a site on a map of Cornwall which shows that level of erosion.*

### **Saddle veins**

**D**

*A telephone directory or pile of thin A4 sheets of paper or rubber strips is held at both ends and then bent so that hollows form at the fold crest.*



**Veins**

**A I 10 min**

*Students are given slices or a vein or photos or diagrams and must comment on them (symmetry, hollows in centre, may be several different layers of one individual mineral, crystal faces facing inwards etc).*

**Distribution of veins**

**A I 10 min**

*Students look at a map e.g. Derbyshire and describe their distribution and work out what lithological and structural controls there were.*

**Origin of hydrothermal fluid**

**I F 10 min**

*Students work out the crystallisation history of a silicic magma and find when free water becomes available.*

**Gaps caused by normal faulting**

**E P F 15 min for each parameter**

*To determine how bed thickness, displacement, and angle of fault plane in each bed control the size of the gap that develops when a normal fault cuts two different rock types. Students draw strata and then cut along the fault plane and note the effect of movement on the size of the gap.*