A really brief history of art I
with respect to Chemistry
South Africa 1925

260 g 8 cm jasperite cobble

2.5-2.9 million years old

Makapansgat pebble
natural but manmade?
Prehistoric tools
Obsidian/Flint
The birth of Art
Paleolithic - Neolithic
35,000 BC  25,000BC  15,000BC  12,000BC  7,000BC  6,000BC  4,000BC  2,000BC

Neanderthal  Cro-Magnons
35,000 BC  32,000 BC

Paleolithic paintings and sculptures

End of Ice Age 9,000BC

Neolithic period
Earliest farming and settlements 7,000 BC
35,000 BC       25,000BC  15,000BC  12,000BC  7,000BC  6,000BC  4,000BC  2,000BC

Mineral Pigments  Baked Clay  Gold Ornaments Native  Clay Pots  Makeup Plaster Copper Tin Bronze  Iron Beer

Perfumes  Ointments  Dyes?

Fermented drinks  Soaps  Glass  Metals  Pottery

Pigments + Binders

Ocher

Red  Yellow  Brown  Soot/Charcoal
The rise of Civilization

Ancient Near-East
Writing

Inanna Uruk 3500-3000BC Warka Vase

Sumeria

Standard of Ur 2600-2400BC

Neo-Assyrian, about 883-859 BC
Nimrud northern Iraq

Stele of Hammurabi 1750BC

Akkadian Ruler 2300-2200BC

Nimrud northern Iraq

Toreador Fresco 1500 BC

Assyria

Iron Age

Iron Age

Tyrian Purple, Alum

Steel Utensils

Greco-Roman

Sasanian

3,500 BC 2300BC 1600BC 1000BC 612BC 330BC 224AD 636 AD

Utensils
The flattened skull and jewelry of Queen Puabi just as it was found in her tomb at Ur in Sumeria where Sarah and Abraham were born. Notice, too, her perfect teeth.

3,000BC
Tyrian purple: Imperial Purple
First fabric dye
Alum crystal

\( \text{KAl(SO}_4\text{)}_{12}\text{H}_2\text{O} \)

\( \text{FeAl}_2\text{(SO}_4\text{)}_{22}\text{H}_2\text{O, MgAl}_2\text{(SO}_4\text{)}_{22}\text{H}_2\text{O, NaAl(SO}_4\text{)}_{26}\text{H}_2\text{O, MgSO}_4\cdot7\text{H}_2\text{O and Al}_2\text{(SO}_4\text{)}_{17}\text{H}_2\text{O} \)

**Alum: First mordant for dyes**
Time of the Pharaohs
Art of Ancient Egypt
Copy of wall painting 3500-3200BC

Palette of King Narmer 3000-2920BC

Tomb of Nebamun Fresco 1400-1350BC

Glass jar 1500 BC

Cobalt blue 1550-1070 BC

Last Judgement of Hunefer 1290-1280 BC

Colored Glass

New Pigments

Glazes

Early Dynastic

Old Kingdom

Middle Kingdom

New Kingdom

Greek

Roman
Egyptian pigments: many more colors
Egyptian Blue

$4 \text{SiO}_2 : 1 \text{CaO} : 1 \text{CuO}$ to a temperature of 900°C using a flux of sodium carbonate

$$\text{Cu}_2\text{CO}_3(\text{OH})_2 + 8 \text{SiO}_2 + 2 \text{CaCO}_3 \rightarrow 2 \text{CaCuSi}_4\text{O}_{10} + 3 \text{CO}_2 + \text{H}_2\text{O}$$

Lapis lazuli

Na$_{8-10}$Al$_6$Si$_6$O$_{24}$S$_{2-4}$

Ultramarine

Egyptian blue: first synthetic pigment

Ultramarine: A very expensive blue
Azurite $\rightarrow$ Malachite

Malachite: the only green
Bone Black
Chalk White
Lead White
Orpiment
Malachite
Cinnabar
Ultramarine
Egyptian blue
Realgar
Lead red