GLAZE

• Glazes are vitreous coatings applied to the surface of wares to decorate them or make them impermeable
• An aqueous suspension of glaze ingredients (modifiers and colorants) are sprayed or painted onto the pottery surface.
• After drying, it is fired in a kiln with proper temperature and atmosphere

STUDY OF GLAZE

• What is the physical basis of the appearance of the glaze?
• What raw materials went into it?
• What sequence of steps did the potters choose to develope?
• How were these procedures refined to produce a desired effect?
GLAZED POTTERY

GLAZE

APPEARANCE OF GLAZE IS DUE TO INTERACTION OF LIGHT WITH THE

- Outer surface of the glaze.
- Interface between the glaze and the underlying ceramic body
- Substance of the glaze itself
**THERMAL HISTORY OF GLAZE**

Thermal history of glass: Heat and cool glass types are shown here. Glass is held at a high temperature to melt impurities and allow vitrification to occur. While being formed, the glass may be reheated many times. A CO2 laser is fired on the glaze at a high temperature, cooled rapidly, ground to a powder, applied as a glass and held at a lower temperature. Clear lead and lead-free glasses are held at peak temperature briefly. To achieve translucency, the glass is cooled slightly to increase crystals and then held at a high temperature for some time to allow the crystals to grow.

**INTERNAL REFLECTION**

Internal reflection diagram showing incident light and its reflection through layers of air, varnish, paint, and glass surfaces.

**INTERACTION OF LIGHT WITH GLAZED SURFACES**

Light interacts in different ways with different glazes. A lead glass (left) is transparent and lightly reflective. A matte glaze (middle) has crystalline pigmentation at the surface, which scatters light. A celadon glaze (right) is matte opaque, white, or opaque, which scatters light. A crystal base with the glaze interface also reflects light.

**GLAZE COMPONENTS**

- **Modifiers:** Added to glaze as a flux to bring the melting temperature down. They are oxides of Na, K, Pb, Ca, Ba, Mg, Zn, and Al. PbO or Pb2O4 is most commonly used.
- **Colorants:**
  a. Iron oxides: yellow, red, brown
  b. Copper oxides: green, turquoise, blue
  c. Cobalt oxide: clear blue
  d. Manganese oxide: Purple-violet
  e. Chromium oxide: red, brown, green
  f. Nickel oxide: dark greens
  g. Gold: With tin oxide yields deep purple
  h. Tin oxide: gives white opacity
TYPES OF GLAZE

- Classification by their maturing temperature
  a. 900-1050°C Majolica glaze
  b. 1000-1150°C Earthenware glaze
  c. 1200-1300°C Stoneware glaze
  d. 1300-1400°C Porcelain glaze

- Classification by content (modifiers)
  a. Lead glazes
  b. Alkaline glazes
  c. Slip glaze

- Classification by visual effects
  a. Crackle glaze
  b. Matt glaze
  c. Crystalline glaze
  d. Lustre

SLIP GLAZE

Earliest type of glaze. Applied on pottery as a suspension of very fine clay with an added flux of a salt or ash. Fired for a short time at temperatures between 600 and 1000 degrees Celsius. They melt only partially and so remain permeable.

GLAZE COMPONENTS

<table>
<thead>
<tr>
<th>Component</th>
<th>SIR</th>
<th>GAI</th>
<th>ATTIC WARE</th>
<th>CHINA</th>
<th>STONE</th>
<th>ZNIK</th>
<th>TILES</th>
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2nd MILLENNIUM ANATOLIAN POTTERY
ATTIC VASES

Finest suspension of clay and hematite particles are slip painted on areas to be rendered black. The wares were fired in reducing atmosphere to convert all hematite to black magnetite. During the process fine-particled slip glaze sinters into a glossy surface where as coarser clay body remains unsintered. Kiln is then opened for more oxygen so that porous clay areas can reoxidize to a red color.

POTTERY FROM HELLENISTIC PERIOD

PHYRIGIAN POTTERY 1st MILLENNIUM BC
SEH GABI PAINTED WARE

- The glaze components are fritted at high temperatures (1,050 °C)
- The frit is then ground up, mixed with water, applied to the clay body and refired at a lower temperature.
- Process produces less permeable glaze

STONEWARE GLAZES

(4,000 BC Egypt)

- A gritty paste was prepared from crushed quartz, sodium or potasium flux, limestone and copper salts.
- The paste would effloresce (form a fine powder layer) onto the surface after drying and heating it.
- When fired the efflorescence would melt and form a translucent, blue, glassy coating.

CHINESE GLAZE TECHNOLOGY

- Achievement of firing temperatures above 1000° C with superb material (loess) for high temperature kilns.
- Discovery of nonclay glaze stones such as limestone and “China stone” (sericitic clay and quartz) that can be used to prepare a high firing glaze.

İZNİK TILES

- The clay tile was first covered with a layer of white quartz paste.
- Artisans formulated blue, green and turquoise frits using cobalt and copper, reds, grey-greens and black were obtained from iron, chrome and chromite ores to decorate exuberant floral designs.
- The surface is then covered by a thin, brilliant clear lead glaze.
GLAZED PANELS FROM NINEVAH

TOXICITY OF LEADED GLAZE

• Incompletely melted leaded glaze may contain unreacted lead oxides that may dissolve in acidic medium.
• A prefritted glaze ensures that the lead particles are completely melted and locked into sicate glass structure.