

# CAUTION IN THE STUDIO KEEPS THE DOCTOR AWAY: CERAMICS AND SAFETY

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## **ABSTRACT**

*Ceramic production is rife with many hazards and students and practitioners in the field stand the danger of being affected by them. These problems can be highly disastrous to humans, animals and the environment; therefore they should not be treated with levity. The two main safety areas of great anxiety are: injuries to the physical anatomy and hazards resulting from the use of ceramic raw materials. Unfortunately, as serious as these risks are, they are seldom discussed and as a result, public awareness about them is low. Few people (including teachers, students and professionals) are aware of the approved safety measures to follow strictly in order to make the practice safe for themselves and others and not much has been done to educate the public on how they can protect themselves and their environment from the threats. It is against the background of the apprehension of the consequences of the risks intrinsic in ceramic production and for the purpose of generating public awareness of the dangers as well as proffering some safety measures against them, that this present essay has been written.*

## **Introduction**

Pottery production is a relatively safe venture when compared to some other professions; however, there are a number of possible threats that are peculiar to the trade which if ignored can actually make the practice a perilous business. Two foremost safety areas of concern are: hazards from ceramic raw materials and injuries to the physical anatomy. These perils are also a few of the challenges of teaching and learning ceramics in Nigerian tertiary institutions.

A general assumption is that people, especially professionals in the field are conscious of these hazards and the necessary safety measures required in the profession. The contrary is sometimes the case with many persons. Many users of ceramic materials and equipment are inattentive and careless in their use of these items, especially their failure to observe approved safety measures. Actually, public awareness of the dangers inherent in the production of ceramic wares is relatively minimal. What makes this problem worthy of

attention is the fact that the effects of these hazards are extensive and can be detrimental to humans, animals, plants and the environment. Yet, up till now in Nigeria, only a cursory attention has been paid to this menace, consequently, the gravity of the problem is not comprehended sufficiently. The corollary of this is that most producers practise at their own jeopardy and at great risk to others. Besides, the teaching of ceramics in tertiary institutions does not include courses specifically on safety measures, especially on the proper use of studio equipment and ceramic raw materials. Often, one comes across students (as this author has on several occasions) who fail to exercise prudence for their own safety and which failure causes severe accidents and injuries in the studio. As observed, some of them fail to follow strictly approved safety measures either out of ignorance, carelessness or sheer laziness.

In view of these facts, raising awareness of these ever-present dangers and the safety measures required to combat them constitute a pertinent area of research. In

an era when the human quest for civilization is incessantly unleashing serious health problems and environmental challenges, any effort that ensures the preservation and improvement of the quality of human lives and the preservation of our environment is of great significance. This is a motivation for this essay. It is against this backdrop of the fear of the consequences of the risks inherent in ceramic production and the need to create public awareness of the dangers listed hereunder that this present essay has been written.

Apart from identifying and discussing these probable dangers and their effects, this essay also more importantly, recommends apposite safety measures to curtail, combat or avert the danger. Taking time to observe the safety measures recommended in this essay is indubitably valuable because as the popular cliché asserts, “a stitch in time saves nine” and to this we add one of ours coined expressly to sum up the thesis of this essay: “caution in the studio keeps the doctor away.” Before these issues are discussed further, it is necessary to know what these hazards actually are.

### **Probable Hazards Inherent in Ceramic Production**

The risks involved in ceramic production are numerous. The major threat areas will be discussed under two broad categories, namely: the hazard of physical injuries and the risks associated with the use of toxic ceramic raw materials.

#### **Physical Injuries in Ceramic Studios**

Persons who work in ceramic studios (workshops and industries) are prone to all kinds of bodily injuries: lacerations, severe burns, fractures and repetitive strain injuries. Such injuries can be minor or extremely grave and extensive.

#### **Lacerations and Wounds**

Lacerations, abrasions, gashes and puncture wounds are common injuries that are easily sustained in the ceramic studios and industries. Severe physical harm and even death could result, for example, from wrong or careless handling of studio tools

and equipment. The best way to avoid this is to know the proper way to use these devices by observing diligently the necessary safety measures recommended by the manufacturers of such gadgets. For instance, all studio equipment must be properly constructed, installed and maintained for them to function well and safely. And all their components require routine inspections for damages that may cause them to malfunction and cause severe harm.

Gadgets used in the studios are easy to operate, but they can be hazardous if handled incorrectly. For instance, extruders, especially those with wheel handles that are not fitted with safety locks can cause serious injury if the operator loses grip and the hand accidentally slips in between the wheel. The pressure within the barrel can forcefully reverse the action of the gear and steering wheel and twist a hand caught in between the wheel (Piancoh, 2000:8). Other equipment like the potter's wheels, jigger-jolleying machines, plungers, and the like, can also become unsafe if handled wrongly (Fig 1). Even small tools such as knives, needles and cutting wires can cause lacerations if mishandled.

Poor maintenance of studio tools and equipment can make them extremely dangerous to use. Therefore, they require not only careful usage, but also regular servicing and maintenance in ensuring that they function properly and are harmless to use. Proper cleaning and storage are equally important. Studio equipment and tools need to be kept sanitary. Tools should be stored in appropriate boxes after use and those with pointed edges that can cause severe injuries should have their sharp edges sheathed or wrapped in paper or rags.

#### **Burns and Blisters**

Burns and blisters (minor and severe) from heat and flames are frequent injuries sustained during firing sessions because kilns are normally fired to very high temperature. Hence every potter must be conversant with some vital points about kiln

usage in order to ensure their safe usage. For example, opening the lid or door of a kiln when it is in use is perilous. The power or fuel must be turned off after firing the kiln and it must be left to cool down fully to the point where the fired wares can be handled comfortably by hand (preferably well below 100° C) before it is opened or unloaded. In addition, to avoid burns, it is wise to use personal protective gear (kiln mitts or gloves) when handling hot kilns and wares. Another crucial point to note is that peeping into kiln spy holes with the naked eyes, especially during firing is unsafe as the hot glowing heat can damage the eyes. A recommended safety measure for this purpose is to shield the eyes with dark protective glasses specially manufactured for the potter's use.

Fire outbreak is a major menace in the studio. This could come from many sources: careless handling and improper storage of fuel, faulty wiring, defective electrical gadgets, cigarette smoking, et cetera. Another common cause of fire outbreak in the studio is an abandoned kiln during firing, especially the fuel-fired models. The safest way to use kilns is to watch them vigilantly from the pre-heating stage until they reach a temperature at which the flames burst out from the fuel. Moreover, the heat that radiates from the kiln is highly inflammable and is capable of igniting combustible items in the vicinity of the kiln and this could cause fire accidents. Consequently, storing items on or near a kiln during firing is highly hazardous. Improper storage of fuel, especially gas, kerosene, wood and waste oil) can also result in fire eruptions, thus, they need to be stored properly and away from places where they are likely to create problems. Gas is a fuel that is easily ignited, therefore when it is used as the source of fuel in firing kilns, it is prudent to examine the gas cylinders and hoses for leakage frequently to avoid fire outbreak and explosions. Gas-filled cylinders should be located at a safe distance from the kiln or if possible, outside the kiln room. It is a necessary precautionary measure to ensure that kilns rooms are well-ventilated, sanitary and free of combustible items. Indispensable

items in kiln rooms are metal buckets filled with dry sand, barrels of soapy water and functional fire-extinguishers (Fig. 2).

Most studio equipment are powered by electricity. This is a source of energy that is very hazardous if not handled with care. Extra caution must be applied when dealing with electrical appliances. Electric kilns, for example, must not be located in wet places or touched with wet hands (Fig. 3). Similarly, it is important to elevate kilns at least thirty centimetres from the floor and in dry areas. Operating an electric kiln in a damp spot is dangerous and could lead to electrical shocks or electrocution, especially when electrical wirings are faulty. It is sensible also to overhaul regularly all electrical gadgets and expert services are mandatory for electrical wirings, repairs and maintenance jobs. And as Ikeneri (20011: 86) rightly warned, potters should avoid being "over-zealous about the "do-it-yourself" option," thus complex repairs and maintenance work should be left for the experts to handle.

Kilns emit toxic fumes in addition to intense heat during firing. Because such pollutants constitute a health hazard, kilns are best located outdoors, however, if positioned indoors, they must be properly vented to the outside so that the resultant fumes and gases are emitted outdoors and prevented from concentrating indoors. Prolonged inhalation of such fumes can cause severe health problems.

### **Strain Injuries**

Common complaints that result from working in ceramic studios and industries are strain injuries in various parts of the body. These problems occur because of the strenuous, time-consuming, monotonous, repetitive and labour-intensive nature of the processes involved in production. By far the most common of these complaints are aches, trauma, tension and ailments referred to in medical terms as repetitive strain injuries. Persons who are involved in mass production such as in ceramic industries or those who work for protracted periods at a stretch are particularly at the highest risk of

suffering from these conditions. Some prevalent examples of such excruciating injuries like elbow tennis, bursitis, and carpal tunnel syndrome, joint and muscle strains, especially in the back or waist regions are due to the use of wrong body postures at work and when hauling heavy gadgets or bulky materials.  
(<http://ergonomics.about.com/od/carpaltunnelsyndrome/a/bursitis.htm>).

An effective way to avoid this problem as experts counsel is to adopt the use of appropriate body mechanics and ergonomics. It is advisable, for example, to place the strain on the knees and thigh muscles to take the weight off the back and waist region while lifting heavy items (Ibid).

Wrong sitting posture for long hours of work on the potter's wheel is a common cause of severe strain on the neck, back and waist areas. Avoiding long hours of fatiguing repetitive chores without adequate break periods or relaxation in-between working sessions would greatly reduce this problem. Thus, it is recommended that adequate periods of rest be maintained during working hours to help the body rejuvenate sufficiently.

The risks from bodily injuries cannot be overstressed as they can become real serious cases that may lead to death if ignored. For instance, lacerations and puncture wounds could turn septic and result in severe infections such as tetanus. All injuries and open wounds require prompt medical treatment and they must be kept sanitary until they heal up properly. It is also advisable to avoid contact with ceramic materials while recuperating to prevent contagion from toxins because some ceramic materials are very dangerous as noted below. Moreover, certain medical conditions may deteriorate due to the methods and materials used in ceramic production as typified in the aggravated conditions noticed in potters who suffer from rheumatoid arthritis due to incessant contact with water and damp substances and conditions.

### **Threat from the Use of Ceramic Materials**

Researchers have confirmed the high level of risks associated with exposure to many of the chemicals, oxides and materials that are indispensable in the production of glazes and clay bodies due to their toxic nature. For example, as Coyle (1982:763) and Fournier (1978:206) noted, barium metal and compounds are highly poisonous substances. Lead oxide, a common mineral used in glazing is an extremely noxious substance (Kirkpatrick, (1978:465). Lead and its compounds can be absorbed into the body until a lethal amount is accumulated that may cause progressive renal disease in adults and cognitive deficiency in children (*The New Encyclopedia Britannica*, 1998).

Also, crystalline silica, a mineral that is inherent in many ceramic materials has the tendency to amass in the lung tissues if inhaled where it causes severe tissue damage (Howe, 1981). Other toxic ceramic raw materials are: alumina, a material which is found in most clays and glazes and asbestos fibre (also present in muscovite, lipidolite vermiculite and mica), and gum Arabic which is used frequently to stiffen dry glaze coats on bisque wares before glaze-firing. These materials are capable of causing lung irritation if inhaled. Cadmium, selenium, potassium dichromate, potassium dichromate and barium are equally poisonous substances that can leach into and pollute foods and liquids if they are used in the composition of glazes and clay bodies used in the production ceramic tableware.

Some raw materials such as uranium are particularly dangerous because they remain radioactive even after they are fired. Although when used in fritted form the risks associated with these materials are relatively reduced, nonetheless, the key to avoiding poisoning is not to use any of these toxic materials in the production of wares, especially utensils meant for food or drinks. Poisoning may occur from toxic raw materials when utensils used for storing or mixing raw materials are used for cooking, eating or drinking. This must be avoided and all containers used for ceramic production must be exclusively reserved for that

purpose because even the most rigorous cleaning is not guaranteed to eliminate all traces of the materials.

A pertinent point to make is that the dangers inherent in the production of ceramic products are not restricted to humans and animals as they also constitute a major threat to the environment. Indiscriminate pollution of the environment in whatever form or degree is a serious threat because as Adodo (2000) rightly noted, not only are human beings the products of their environment, "our climate and vegetation contribute in some measure to our happiness and sense of wellbeing." What is the extent of this threat from ceramic production?

### **The Dangers of Environmental Pollution**

Areas where ceramic industries, studios and workshops are located are usually polluted from fumes that emanate from firing kilns, dusts particles that escape from clay and other ceramic materials and improper disposal of waste products. One needs only to visit such sites to realize the vast amounts of effluence that is emitted into the atmosphere unremittingly. Such pollutants have varying adverse effects on the environment and on humans, plants and animals. Because such devastating effects sometimes take a long time to manifest, the gravity of the problem is usually ignored or underrated and the dangers persist unchecked. This is a serious problem because many ailments have actually been traced by scientific studies, to environmental contamination from industrial materials and waste products including ceramic materials and wastes.

As medical experts inform us, dusty particles, for instance, are confirmed sources of aggravation of the health of asthmatic patients, smokers, pregnant women, patients with heart conditions and allergies. Irritation of the nose, throat or eyes is also easily triggered by long-term exposure to pottery dust and the collective effects of dusts particles in the lungs often result in an ailment known as emphysema, for instance. Pollution from crystalline silica

(an essential material in ceramic production) has been cited too as the cause of silicosis, a chronic disease that devastates lung cells and shortness of breath, coughing and body weakness (The New Encyclopedia Britannica, 1998). For example, as Abamwa (2011) revealed, many potters and quarry workers in Bomadi and Patani local government areas of Delta State of Nigeria died from a similar ailment due to the high content of sodium oxide in the clay excavated and used by the potters in those areas. Her chemical analysis of the clays, using instrumental Atomic Absorption Spectrophotometer (IAAS) and direct reading 4000U (DRS), showed that it contained over 15.90 percent of the oxide.

Toxic ceramic raw materials can be damaging to plant life if they find their way into the soil where they unleash their venom on plant roots and they can be lethal if ingested by animals. When the issue of environmental pollution from ceramic production is discussed, the problem of deforestation cannot be ignored. Ceramic production, like other industrial activities contribute to some extent to forest loss. Wood and wood derivatives are common sources of fuel for ceramic firings and logging for wood is one of the causes of the depletion of the forest. This is a serious menace because deforestation devastates plant life that provides sustenance for humans and animals and it is a major cause of erosion, flooding, greenhouse gas, desertification, et cetera.

In addition, environmental pollution results from the firing of ceramic kilns, as mentioned earlier. Toxic gases, especially during reduction or salt firings which are emitted by kilns can irritate the body, cause respiration problems and even deaths. The most lethal of these gases are: carbon dioxide, carbon monoxide and sulfur dioxide. Fuel-burning firings usually release enormous amounts of carbon dioxide and, according to medical experts; over-exposure to the gas causes a plunge in blood oxygen levels, a decrease in hearing and pulse rate, and a rise in blood pressure. Also reduction firing emits carbon monoxide and contact

with the gas can cause severe headache, dizziness, fatigue, drowsiness and sometimes death. Furthermore, the sulfur dioxide released during the firing of soluble metal salts can induce serious irritation of the lungs (Ibid).

Because of the destructive effects of toxic waste such as these, most developed countries promulgate and enforce regulations prohibiting the location of industries in residential area. Unfortunately, in Nigeria such laws are not fully enforced (if they exist at all) as ceramic and other industries that use harmful materials are allowed to operate unrestricted in inhabited areas without ample concern for the environmental impact of their production processes.

Therefore, this essay joins forces with all concerned individuals, organizations such as the Ceramic Association of Nigeria (CerAN) and the Federal Environmental Protection Agency (FEPA), the National Agency for Food and Drug Administration Control (NAFDAC) and other instruments of intervention in pollution control in clamoring for the protection and conservation of our environment.

Unfortunately, due to the exigencies of the profession, some of these toxic materials are essential in ceramic production and producers of ceramic products are compelled to use them despite the risks involved. Consequently, it is imperative that users of such materials understand the nature and effects of the materials they use, and that they take suitable precautions in order to guarantee that their health and that of the unsuspected public are not impaired and that the environment is safe and healthy.

The issue of the risks from ceramic materials is a critical one in a developing country like Nigeria, where insufficient quality raw materials is one of the many challenges crippling the development of ceramic industries and the teaching and learning of the subject in Nigerian tertiary institutions (Ojie, 20047). Because of this

problem, most studio potters and small-scale industrialists often resort to foreign importation of their raw materials which makes production cost exorbitant and those who attempt to reduce cost by producing their required materials locally are faced with the problem of contamination from toxic materials. This is a serious issue because in Nigeria, every practicing ceramist becomes a geologist and a mining engineer who is compelled to excavate his own materials because the ceramic raw materials processing sector of our industrial economy is under developed (Ekwere, 2009). Since ceramic production relies on the use of a majority of these materials, a pertinent question, therefore, is: how can the dangers posed by poisonous chemicals and oxides in pottery production be circumvented?

### **The Use of Fritted Components in Glazes and Clay Bodies**

One way to reduce the toxins inherent in some ceramic raw materials is the use of fritted components in compounding glazes and clay bodies. This would significantly lessen the risk of contaminations from poisonous raw materials. Commercially produced glazes and clay bodies are recommended because they are produced from fritted components. But where this is not available or not readily accessible, potters can safely produce their materials locally if they adhere strictly to the obligatory basic safety measures recommended below.

### **Adequate Use of Protective Studio Gears**

The use of standard protective equipment is required for adequate safety in studios and industries. Those recommended by Speight (1989) include respirators, dust masks, latex or rubber gloves, especially when working with colourants and glaze materials. Others indispensable studio requirements are: functioning fans and hoods for venting toxic fumes, air cleaners, dust collectors, spray boots, vacuum cleaners with special filters, fire extinguishers, first aid kits, etcetera (Fig. 3). In addition to the use of standard protective gears and equipment in the studios, potters need to be acquainted with the nature and proper usage of the materials and equipment they utilize.

Manufacturers of commercially produced ceramic materials, glazes or stains usually provide along with their products detailed instructions of the components of their merchandise and also recommendations on their safe use. Therefore, all warning labels which identify hazardous ingredients and their dangers and the first aid instructions provided with the products must be read and comprehended amply before any attempt is made to use the items. When these are unavailable or inaccessible, edifying relevant information can be obtained directly from the suppliers if possible or from other sources such as the Internet.

#### **Imbibing Good Studio Habits**

Potters need to cultivate healthy studio habits. Firstly, ceramic studios are unsafe places for the storage of foods and drinks, or for eating, drinking and smoking. Secondly, ceramic materials should never be ingested and in case of any inadvertent ingestion, prompt medical attention should be obtained. Thirdly, a necessary precaution to take when handling pottery receptacles, especially those that have remained untouched for a long time is to check their interiors for dangerous insects and reptiles. Pottery wares are very conducive habitations for snakes and scorpions, for instance, because of their cool interiors. Fourthly, cleanliness in the studio is very important and mandatory as they are usually dusty, dirt-laden and germs-infested due to the materials involved in production processes (clay, oxides, and so on).

However, constant cleaning not only reduces dust accumulation in the studio, it keeps the area sanitary and free of debris and germs. However, cleaning and dust-generating activities necessitate the use of respirator or nose masks which must be kept dirt free. Likewise, all studio implements must be scrubbed clean after use. Finally, personal hygiene is imperative to ensure cleanliness and good health. Regular baths after work and meticulous washing of the hands are indispensable sanitary measures.

#### **Suitable Dressing in Ceramic Studios and Workshops**

The right choice and care of studio outfits are equally important. As in other professions, suitable clothing and footwear are required for studio or industrial work to ensure personal hygiene, safety and to prevent the spread of irritation or toxic materials. Thus, smocks, caps and aprons, for example, are recommended. Fashion fanatics must be mindful of the danger of wearing high-heeled shoes which can easily trip and fall the wearer, dangling jewelries that might get entangled around protrusions on studio equipment, attires made of highly inflammable materials (polyester, nylon, plastic, and the like, especially during firing) and the use of contact lenses that may trap dust on the eyeballs and cause infections of the eyes.

Judging from all that have been said so far, it is evident that the need to apply adequate caution in the studio cannot be overemphasized as it is a guaranteed defense against inherent dangers in ceramic production.

#### **Conclusion**

From the foregoing, it is clear that as it is with all human endeavour, ceramic production involves a certain degree of risks and that the hazards can be avoided or reduced if adequate caution is applied and the right safety measures are employed. The issue of the dangers involved in the production of ceramic wares should be the concern of all persons, particularly students, teachers and professionals in the field. Producers of ceramic wares must make efforts to learn how to protect themselves, the masses and the environment from the hazards associated with their profession. Thus, this paper draws attention to the various ways that the practice negatively affects not only humans and animals, but also the environment. Additionally, it provides valuable information on ways to minimize and prevent these hazards and some requisite safety measures that would guarantee safe studio practice. The two key safety areas discussed are injuries to the body and hazards from toxic raw materials.

The safety measures recommended include: careful handling and regular maintenance of studio tools and equipment, correct use and storage of fuel, proper waste disposal, the use of fritted components in glazes and clay bodies, adequate use of protective studio gears and suitable dressing, imbibing good

studio habits and good sanitary conditions. The points raised above cannot be overstressed because in most developing countries like Nigeria, these hazards exist unchecked and the general public is exposed continually to the dangers they pose.



Figure 1: A Jigger-Jolley Machine  
Source: Photograph by Josephine Chukwu



Figure 2: Fire-Extinguishers.  
Source: Photograph by Sweet U. Ebeigbe, 2011.



Figure 3: An Electric kiln  
Source: Personal Collection



Figure 4: A Pair of Rubber Gloves and a Respirator  
Source: Photograph by Sweet U. Ebeigbe, 2011

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