As we have mentioned before this fact can be easily verified. It can also be verified that an atom is a prime quantum iff it as a prime.

Example 4. Let R be a rank one valuation ring. Obviously R is a quasi-local ring of Krull dimension 1. So that by Example 2, above every non zero non unit of R is a quantum. Further, R being a valuation ring if x is a non zero non unit of R then for every positive integer n and for every $x_1, x_2 | x^n$, $x_1 | x_2$ or $x_2 | x_1$ (holds vacuously). And if x is non co-prime to ab then at least one of a,b is a non unit and so is non co-prime to x . Moreover if $y | x^n$ for some n such that $y | ab$ then $y = y_1 y_2$ where $y_1 | a$, $y_2 | b$ (follows from the fact that a valuation ring is HCF). So we have verified that x satisfies (1) and (2) of Def. 3, and thus is a prime quantum. It may be noted that x is an arbitrary non unit of R.

(3) Comparing Examples (1), (2) and (4) we see that any atom which is not a prime can serve as an example of a quantum which is not a prime quantum. Also since there exist non Noetherian integral domains of Krull dimension 1, which are not valuation domains we have our examples of non atomic quanta which are not prime quanta.

• (4) Generalized Unique Factorization Domains:

Example 5. A UFD is a GUFD. This follows from the fact that a prime is a prime quantum.

Example 6. A rank 1, valuation domain. Each non zero non unit of a rank one valuation domain is a prime quantum (Ex.4) and so the statement that, "Every non zero non unit is a product of a finite number of distinct prime quanta." is satisfied.

Example 7. Let S be the product of two copies of positive